

Appendix H

Detailed Cost Estimate Worksheets

Table 7-4 Cost Summary for Remedial Alternatives - Little Lake Butte des Morts
125 ppb

Alternative	Dredge Volume (cy)	TSCA Dredge Vol. (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	1,689,173	16,165	\$37,700,000	---	---	\$3,200,000	\$1,900,000	---	---	\$184,200,000	\$4,500,000	\$231,500,000	\$46,300,000	\$277,800,000
C2	1,689,173	16,165	\$37,700,000	---	---	\$36,200,000	\$2,100,000	---	---	\$45,700,000	\$4,500,000	\$126,200,000	\$25,240,000	\$151,440,000
D	1,689,173	16,165	\$36,700,000	\$1,700,000	---	---	\$2,100,000	---	\$69,300,000	\$1,700,000	\$4,500,000	\$116,000,000	\$23,200,000	\$139,200,000
E	1,689,173	16,165	\$37,700,000	---	---	\$3,200,000	\$1,900,000	\$69,900,000	---	---	\$4,500,000	\$117,200,000	\$23,440,000	\$140,640,000
F	1,253,873	16,165	\$32,300,000	\$1,700,000	\$33,600,000	---	\$1,800,000	---	\$69,300,000	\$2,000,000	\$4,500,000	\$145,200,000	\$29,040,000	\$174,240,000

250 ppb

Alternative	Dredge Volume (cy)	TSCA Dredge Vol. (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	1,322,818	16,165	\$32,000,000	---	---	\$3,200,000	\$1,600,000	---	---	\$144,300,000	\$4,500,000	\$185,600,000	\$37,120,000	\$222,720,000
C2	1,322,818	16,165	\$32,000,000	---	---	\$28,400,000	\$1,800,000	---	---	\$35,800,000	\$4,500,000	\$102,500,000	\$20,500,000	\$123,000,000
D	1,322,818	16,165	\$31,000,000	\$1,700,000	---	---	\$1,800,000	---	\$69,300,000	\$2,000,000	\$4,500,000	\$110,300,000	\$22,060,000	\$132,360,000
E	1,322,818	16,165	\$32,000,000	---	---	\$3,200,000	\$1,600,000	\$54,700,000	---	---	\$4,500,000	\$96,000,000	\$19,200,000	\$115,200,000
F	999,117	16,165	\$27,900,000	\$1,700,000	\$31,600,000	---	\$1,600,000	---	\$69,300,000	\$2,000,000	\$4,500,000	\$138,600,000	\$27,720,000	\$166,320,000

500 ppb

Alternative	Dredge Volume (cy)	TSCA Dredge Vol. (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	1,023,621	16,165	\$27,000,000	---	---	\$3,200,000	\$1,400,000	---	---	\$111,700,000	\$4,500,000	\$147,800,000	\$29,560,000	\$177,360,000
C2	1,023,621	16,165	\$27,000,000	---	---	\$22,000,000	\$1,600,000	---	---	\$27,700,000	\$4,500,000	\$82,800,000	\$16,560,000	\$99,360,000
D	1,023,621	16,165	\$26,000,000	\$1,700,000	---	---	\$1,600,000	---	\$69,300,000	\$2,000,000	\$4,500,000	\$105,100,000	\$21,020,000	\$126,120,000
E	1,023,621	16,165	\$27,000,000	---	---	\$3,200,000	\$1,400,000	\$42,400,000	---	---	\$4,500,000	\$78,500,000	\$15,700,000	\$94,200,000
F	771,564	16,165	\$23,700,000	\$1,700,000	\$28,700,000	---	\$1,400,000	---	\$37,300,000	\$2,000,000	\$4,500,000	\$99,300,000	\$19,860,000	\$119,160,000

1000 ppb

Alternative	Dredge Volume (cy)	TSCA Dredge Vol. (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	784,192	16,165	\$22,100,000	---	---	\$3,200,000	\$1,300,000	---	---	\$85,600,000	\$4,500,000	\$116,700,000	\$23,340,000	\$140,040,000
C2	784,192	16,165	\$22,100,000	---	---	\$16,900,000	\$1,400,000	---	---	\$21,300,000	\$4,500,000	\$66,200,000	\$13,240,000	\$79,440,000
D	784,192	16,165	\$21,100,000	\$1,700,000	---	---	\$1,400,000	---	\$37,300,000	\$2,000,000	\$4,500,000	\$68,000,000	\$13,600,000	\$81,600,000
E	784,192	16,165	\$22,100,000	---	---	\$3,200,000	\$1,300,000	\$32,500,000	---	---	\$4,500,000	\$63,600,000	\$12,720,000	\$76,320,000
F	635,547	16,165	\$20,100,000	\$1,700,000	\$23,600,000	---	\$1,300,000	---	\$37,300,000	\$2,000,000	\$4,500,000	\$90,500,000	\$18,100,000	\$108,600,000

5000 ppb

Alternative	Dredge Volume (cy)	TSCA Dredge Vol. (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	281,689	16,165	\$8,900,000	---	---	\$3,200,000	\$1,000,000	---	---	\$30,900,000	\$4,500,000	\$48,500,000	\$9,700,000	\$58,200,000
C2	281,689	16,165	\$8,900,000	---	---	\$6,100,000	\$1,100,000	---	---	\$7,700,000	\$4,500,000	\$28,300,000	\$5,660,000	\$33,960,000
D	281,689	16,165	\$7,900,000	\$1,700,000	---	---	\$1,100,000	---	\$37,300,000	\$2,000,000	\$4,500,000	\$54,500,000	\$10,900,000	\$65,400,000
E	281,689	16,165	\$8,900,000	---	---	\$3,200,000	\$1,000,000	\$11,700,000	---	---	\$4,500,000	\$29,300,000	\$5,860,000	\$35,160,000
F	222,635	16,165	\$8,000,000	\$1,700,000	\$11,700,000	---	\$1,000,000	---	\$37,300,000	\$2,000,000	\$4,500,000	\$66,200,000	\$13,240,000	\$79,440,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE LAKE BUTTE DES MORTS
Action Level - 125 ppb

Material Handling Assumptions:

Volume > 125 ppb	1,689,173	cy	761	ac	1,289,445	m3	Acres corresponds to dredge footprint area
Volume > 250 ppb	1,322,818	cy			1,009,785	m3	
Volume > 500 ppb	1,023,582	cy			781,360	m3	
Volume > 1,000 ppb	784,192	cy			598,620	m3	
Volume > 5,000 ppb	281,689	cy			215,030	m3	
Volume > 50,000 ppb	16,165	cy			12,340	m3	
Solids Specific Gravity	2.51						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.3%	v/v	0.99	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density (passive pond)	20%	w/w	9.1%	v/v	0.96	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	28.5%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.8%	w/w	60.0%	v/v	1.35	tons per cy	
Arrowhead/Menasha CDF Capacity	1,406,932	cy		in situ	1,337,963	m3	
HTTD Treatment Capacity	1,099,327	cy		in situ	1,650,000	tons	
Cap Volume	435,300	cy			332,290	m3	
Vitrification Treatment Capacity	4,496,073	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						Not Used
Sales Tax	5.5%						
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Debris Sweep	\$16,000	per acre					Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					
Hydraulic - 10-inch Cutterhead							
Site Preparation	\$100,000	per dredge launch site					pj
Mobilization - Equipment	\$135,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift					Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift					Ogden Beeman (Oct 11, 2000)
Site Restoration	\$600,000	per dredge launch site					pj
Mechanical - 3 cy bucket							
Dock Construction	\$400,000	LS					pj
Mobilization - Equipment	\$455,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS					Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea					Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$9,000	per shift					Ogden Beeman
Dredge Rate	630	cy in situ per 10 hour shift					Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area					pj
Free Water per cy Dredged (10%)	20	gal					Ogden Beeman
Offload Crane Mobilization	\$50,000	LS					pj
Site Restoration	\$75,000	LS					pj
High Temperature Thermal Desorption							
Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					
Vitrification							
Vitrification (unit cost incl Cap and Op Costs)	\$27.0	per ton (250 glass ton per day melter unit)					Unit Cost Study- Minergy
Capping							
Mobilization/Site Prep	\$200,000						Ogden Beeman
Area	9,322,396	sf	866,100		m2		
Sand Cap Depth	1.7	feet					
Sand Placement	\$6	per cy					Ogden Beeman
Sand Purchase	\$6	per ton					Ole
Sand Density	1.4	tons per cy					
Armored Cap Depth	1.0	feet					
Cobbles	\$30	per cy					Means
Cap Placement QA	\$100,000	LS					Ogden Beeman
Long-term O&M	2%	of capital					pj
Long-term Monitoring	\$400,000	per year					Anne LTM

Nearshore CDF		Arrowhead	Menasha	
Land Lease or Purchase	\$1.8	per sf	\$1.8	Ole
Length	8,000	lf	9,200	Baird
Capping Volume	190,000	cy	170,000	Baird
Seeding Area	280,000	sy	250,000	Baird
Sheetpile Wall Length	8,000	lf	9,200	Baird
Sheetpile Depth	30	ft	30	based on bathymetry
Sheetpile Cost	\$19	per sf	\$19	pj
Shot Rock Berm	\$650	per lf	\$550	Baird
Rip Rap	\$215	per lf	\$250	Baird
Place Treated Material	\$2	per cy	\$2	pj
Clean Soil Cap	\$10	per cy	\$10	Baird
Seeding	\$1	per sy	\$1	Baird
Mitigation	\$10,000	per acre		Tim
	\$10,000	per year		Tim
Long-term Monitoring	\$650,000	per year		Anne LTM
Long-term O&M	2%	of capital		pj
Solidification				
Percent Lime	10%	(w/w)		Montgomery Watson
Lime	\$60	per ton	Mixing \$25	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)				
Land Lease or Purchase	\$1.80	per sf		Ole
Area	644,791	sf	14.80	2 days slurry + 13 wk solids * 2 cell
Perimeter	3,212	lf	802.9890256	assume square
Depth of Material in Dewatering Cell	8	feet		based on size at Arrowhead Park
Cell Retention Time	24	hours		Not Used
Cell Depth	10	feet		
Mobilization	\$20,000	LS		pj
Clear and Grub	\$2,000	per acre		pj
Berm Volume	10.4	cy per lf		2:1 slope, 8-foot top
Berm Construction	\$6	per cy		pj
Rough Grading	\$0.25	per sf		pj
Alphalt Liner	\$1.50	per sf		pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS		pj
Regrade Berm Soils	\$6	per cy		pj
Seed/Sod	\$1	per sy		Baird
Dewatering - Mechanical				
Mobilization	\$100,000			pj
Holding Pond-Centrifuge	\$80	per bone dry ton		Global Dewatering
Water Treatment				
Flow Rate (passive dewatering)	395	gpm		assume operate 24/7
Unit, Purchase (passive dewatering)	\$691,096	LS		pj
Flow Rate (mechanical dewatering)	484	gpm		
Unit, Purchase (mechanical dewatering)	\$781,094	LS		
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons		pj
Water Treatment QA	\$200	per day		pj, 1 sample/day
Disposal				
Off-Site Disposal				
Load Soil for Hauling	\$2.80	per ton		pj
Round-trip Hauling	2	hours		pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours		pj
Tipping Fee (non-TSCA)	\$43	per ton		St. Paul
Tipping Fee (TSCA)	\$55	per ton		St. Paul
Truck Rate	\$75	per hour		pj
Truck Load	32	tons		pj
Institutional Controls				
Public Education Program	\$100,000			pj
O&M Plans	\$20,000			pj
Deed Restrictions	\$5,000			pj
Annual Costs				
Public Education Program	\$30,000			pj
Maintaining O&M Plans	\$800			pj
Reporting	\$20,000			pj
Long-term Monitoring	\$600,000			Anne LTM
Long-term Monitoring (no action)	\$300,000			Anne LTM

ALTERNATIVE A: No Action

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Off-site Disposal (Passive Dewatering)**SEDIMENT REMOVAL (CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	761	acre	\$12,176,000
Dredging - 12 hour shifts	1609	Day	\$9,171,300
Dredge Monitoring (Water Quality)	1609	Day	\$4,827,000
Sediment Removal QA	1609	Day	\$1,930,800
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$29,675,100
Engineering, Procurement & Construction Management:			3,561,012
Contractor Overhead/Profit:			4,451,265
Total Capital:			\$37,700,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	1,280,733,951	gal	\$512,294
Water Treatment QA	2,253	day	\$450,600
Direct Capital:			\$1,653,989
Engineering, Procurement & Construction Management:			198,479
Total Capital:			\$1,900,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	2,015,159	ton	\$50,378,975
Lime Purchase	201,516	ton	\$12,090,960
Soil Loading	2,015,159	ton	\$5,642,445
Soil Hauling	2,015,159	ton	\$9,446,058
Tipping Fees (non-TSCA)	1,995,874	ton	\$85,822,578
Tipping Fees (TSCA)	19,285	ton	\$1,060,680
Direct Capital:			\$164,441,696
Engineering, Procurement & Construction Management:			19,733,004
Total Capital:			\$184,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$231,500,000

ALTERNATIVE C2: Dredge Sediment With Off-site Disposal (Mechanical Dewatering)

SEDIMENT REMOVAL (CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	761	acre	\$12,176,000
Dredging - 12 hour shifts	1609	Day	12.37692308 \$9,171,300
Dredge Monitoring (Water Quality)	1609	Day	\$4,827,000
Sediment Removal QA	1609	Day	\$1,930,800
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$29,675,100
Engineering, Procurement & Construction Management:			3,561,012
Contractor Overhead/Profit:			4,451,265
Total Capital:			\$37,700,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	403,032	bdh	\$32,242,544
Direct Capital:			\$32,342,544
Engineering, Procurement & Construction Management:			3,881,105
Total Capital:			\$36,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	1,570,606,822	gal	\$628,243
Water Treatment QA	2,253	day	\$450,600
Direct Capital:			\$1,859,937
Engineering, Procurement & Construction Management:			223,192
Total Capital:			\$2,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	806,064	ton	\$2,256,978
Soil Hauling	806,064	ton	\$3,778,423
Tipping Fees (non-TSCA)	798,350	ton	\$34,329,031
Tipping Fees (TSCA)	7,714	ton	\$424,272
Direct Capital:			\$40,788,704
Engineering, Procurement & Construction Management:			4,894,645
Total Capital:			\$45,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$126,200,000

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	15,939	ton	\$398,475
Lime Purchase	1,594	ton	\$95,640
Soil Loading	15,939	ton	\$44,629
Soil Hauling	15,939	ton	\$74,714
Tipping Fees (TSCA)	15,939	ton	\$876,645
Direct Capital:			\$1,490,103
Engineering, Procurement & Construction Management:			178,812
Total Capital:			\$1,700,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	761	acre	\$12,176,000
Dredging - 12 hour shifts	1594	Day	\$9,085,800
Dredge Monitoring (Water Quality)	1594	Day	\$4,782,000
Sediment Removal QA	1594	Day	\$1,912,800
Site Restoration	1	LS	\$600,000
Direct Capital:			\$28,926,600
Engineering, Procurement & Construction Management:			3,471,192
Contractor Overhead/Profit:			4,338,990
Total Capital:			\$36,700,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

CDF CONSTRUCTION - MENASHA

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	27,778	sf	\$50,000
Shot Rock/Rip Rap	9,200	lf	\$7,360,000
Sheetpile Placement	276,000	sf	\$5,244,000
Clean Soil Cap	170,000	cy	\$1,700,000
Seeding	250,000	sy	\$250,000
Mitigation	52	acre	\$516,529
Direct Capital:			\$15,120,529
Engineering, Procurement & Construction Management:			1,814,463
Total Capital:			\$16,934,992
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	338,700	\$5,096,178
Total Present Worth, Longer Term O&M Costs			\$15,026,734
Total Project Capital and O&M Cost			\$32,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	1,555,902,577	gal	\$622,361
Water Treatment QA	2,253	day	\$450,600
Direct Capital:			\$1,854,055
Engineering, Procurement & Construction Management:			222,487
Total Capital:			\$2,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$116,000,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	761	acre	\$12,176,000
Dredging - 12 hour shifts	1609	Day	\$9,171,300
Dredge Monitoring (Water Quality)	1609	Day	\$4,827,000
Sediment Removal QA	1609	Day	\$1,930,800
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$29,675,100
Engineering, Procurement & Construction Management:			3,561,012
Contractor Overhead/Profit:			4,451,265
Total Capital:			\$37,700,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	1,280,733,951	gal	\$512,294
Water Treatment QA	2,253	day	\$450,600
Direct Capital:			\$1,653,989
Engineering, Procurement & Construction Management:			198,479
Total Capital:			\$1,900,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units	Cost
Sediment Treatment	2,015,159	ton	\$54,409,293
Soil Loading	2,015,159	ton	\$5,642,445
Soil Hauling	2,015,159	ton	\$2,361,514
Direct Capital:			\$62,413,252
Engineering, Procurement & Construction Management:			\$7,489,590
Total Capital:			\$69,900,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$117,200,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge to CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Lime Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	805,639	tons	\$4,833,835
Sand Placement	575,457	cy	\$3,452,739
Cobble Purchase and Placement	345,274	cy	\$10,358,218
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$18,944,792
Engineering, Procurement & Construction Management:			2,273,375
Total Capital:			\$21,218,167
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$424,363	\$6,385,097
Total Present Worth, Longer Term O&M Costs			\$12,403,616
Total Project Capital and O&M Cost			\$33,600,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	761	acre	\$12,176,000
Dredging - 12 hour shifts	1179	Day	\$6,720,300
Dredge Monitoring (Water Quality)	1179	Day	\$3,537,000
Sediment Removal QA	1179	Day	\$1,414,800
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$25,418,100
Engineering, Procurement & Construction Management:			3,050,172
Contractor Overhead/Profit:			3,812,715
Total Capital:			\$32,300,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	1,151,157,170	gal	\$460,463
Water Treatment QA	1,672	Day	\$334,400
Direct Capital:			\$1,575,957
Engineering, Procurement & Construction Management:			189,115
Total Capital:			\$1,800,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$113,200,000

**BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE LAKE BUTTE DES MORTS
Action Level - 250 ppb**

Material Handling Assumptions:

Volume > 250 ppb	1,322,818	cy	697	ac	1,009,785	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	1,689,173	cy			1,289,445	m3	
Volume > 500 ppb	1,023,621	cy			781,390	m3	
Volume > 1,000 ppb	784,192	cy			598,620	m3	
Volume > 5,000 ppb	281,689	cy			215,030	m3	
Volume > 50,000 ppb	16,165	cy			12,340	m3	
Solids Specific Gravity	2.51						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.3%	v/v	0.99	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density (passive pond)	20%	w/w	9.1%	v/v	0.96	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	28.5%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.8%	w/w	60.0%	v/v	1.35	tons per cy	
Arrowhead/Menasha CDF Capacity	1,406,932	cy		in situ	1,337,963	m3	
HTTD Treatment Capacity	1,099,327	cy		in situ	1,650,000	tons	
Cap Volume	323,701	cy			247,100	m3	
Vitrification Treatment Capacity	4,496,073	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%		Not Used
Sales Tax	5.5%		
Engineering, Procurement and Construction Mgmt	12.0%		
Contractor Overhead and Profit - Dredging Only	15.0%		

Dredging

Debris Sweep	\$16,000	per acre	Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day	
Sediment Removal QA	\$1,200	per day	
Hydraulic - 10-inch Cutterhead			
Site Preparation	\$100,000	per dredge launch site	pj
Mobilization - Equipment	\$135,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000		Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift	Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift	Ogden Beeman
Site Restoration	\$600,000	per dredge launch site	pj
Mechanical - 3 cy bucket			
Dock Construction	\$400,000	LS	pj
Mobilization - Equipment	\$455,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS	Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea	Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$9,000	per shift	Ogden Beeman
Dredge Rate	630	cy in situ per 10 hour shift	Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area	pj
Free Water per cy Dredged (10%)	20	gal	Ogden Beeman
Offload Crane Mobilization	\$50,000	LS	pj
Site Restoration	\$75,000	LS	pj
High Temperature Thermal Desorption			
Setup Staging Area	\$50,000		pj
Mobilization/Site Prep	\$150,000		Maxymillian
Sediment Treatment QA	\$2	per ton	
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1	
Sand Purchase and Deliver	\$6	per ton	Ole
Blending	\$25	per ton	Ole
HTTD (includes off-gas treatment)	\$75	per ton	Maxymillian
Stack Testing	\$50,000	LS	Maxymillian
Place Treated Material	\$3	per ton	
Vitrification			
Vitrification (unit cost incl Cap and Op Costs)	\$27.0	per ton (250 glass ton per day melter unit)	Unit Cost Study- Minergy
Capping			
Mobilization/Site Prep	\$200,000		Ogden Beeman
Area	8,630,293	sf	801,800 m2
Sand Cap Depth	1.7	feet	
Sand Placement	\$6	per cy	Ogden Beeman
Sand Purchase	\$6	per ton	Ole
Sand Density	1.4	tons per cy	
Armored Cap Depth	1.0	feet	
Cobbles	\$30	per cy	Means
Cap Placement QA	\$100,000	LS	Ogden Beeman
Long-term O&M	2%	of capital	pj
Long-term Monitoring	\$400,000	per year	Anne LTM

Nearshore CDF		Arrowhead		Menasha	
Land Lease or Purchase	\$1.8	per sf		\$1.8	Ole
Length	8,000	lf		9,200	Baird
Capping Volume	190,000	cy		170,000	Baird
Seeding Area	280,000	sy		250,000	Baird
Sheetpile Wall Length	8,000	lf		9,200	Baird
Sheetpile Depth	30	ft		30	based on bathymetry
Sheetpile Cost	\$19	per sf		\$19	pj
Shot Rock Berm	\$650	per lf		\$550	Baird
Rip Rap	\$215	per lf		\$250	Baird
Place Treated Material	\$2	per cy		\$2	pj
Clean Soil Cap	\$10	per cy		\$10	Baird
Seeding	\$1	per sy		\$1	Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	644,791	sf			2 days slurry + 13 wk solids * 2 cell
Perimeter	3,212	lf			assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			pj
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Water Treatment					
Flow Rate (passive dewatering)	395	gpm			assume operate 24/7
Unit, Purchase (passive dewatering)	\$691,096	LS			pj
Flow Rate (mechanical dewatering)	484	gpm			
Unit, Purchase (mechanical dewatering)	\$781,094	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Disposal					
Off-Site Disposal					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Institutional Controls					
Public Education Program	\$100,000				pj
O&M Plans	\$20,000				pj
Deed Restrictions	\$5,000				pj
Annual Costs					
Public Education Program	\$30,000				pj
Maintaining O&M Plans	\$800				pj
Reporting	\$20,000				pj
Long-term Monitoring	\$600,000				Anne LTM
Long-term Monitoring (no action)	\$300,000				Anne LTM

ALTERNATIVE A: No Action

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Off-site Disposal (Passive Dewatering)**SEDIMENT REMOVAL (CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	697	acre	\$11,152,000
Dredging - 12 hour shifts	1260	Day	\$7,182,000
Dredge Monitoring (Water Quality)	1260	Day	\$3,780,000
Sediment Removal QA	1260	Day	\$1,512,000
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$25,196,000
Engineering, Procurement & Construction Management:			3,023,520
Contractor Overhead/Profit:			3,779,400
Total Capital:			\$32,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	1,002,963,239	gal	\$401,185
Water Treatment QA	1,764	day	\$352,800
Direct Capital:			\$1,445,081
Engineering, Procurement & Construction Management:			173,410
Total Capital:			\$1,600,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	1,578,104	ton	\$39,452,600
Lime Purchase	157,811	ton	\$9,468,660
Soil Loading	1,578,104	ton	\$4,418,691
Soil Hauling	1,578,104	ton	\$7,397,363
Tipping Fees (non-TSCA)	1,558,819	ton	\$67,029,213
Tipping Fees (TSCA)	19,285	ton	\$1,060,680
Direct Capital:			\$128,827,207
Engineering, Procurement & Construction Management:			15,459,265
Total Capital:			\$144,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$185,600,000

ALTERNATIVE C2: Dredge Sediment With Off-site Disposal (Mechanical Dewatering)

SEDIMENT REMOVAL (CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	697	acre	\$11,152,000
Dredging - 12 hour shifts	1260	Day	9.692307692 \$7,182,000
Dredge Monitoring (Water Quality)	1260	Day	\$3,780,000
Sediment Removal QA	1260	Day	\$1,512,000
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$25,196,000
Engineering, Procurement & Construction Management:			3,023,520
Contractor Overhead/Profit:			3,779,400
Total Capital:			\$32,000,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	315,621	bdh	\$25,249,652
Direct Capital:			\$25,349,652
Engineering, Procurement & Construction Management:			3,041,958
Total Capital:			\$28,400,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	1,229,967,319	gal	\$491,987
Water Treatment QA	1,764	day	\$352,800
Direct Capital:			\$1,625,881
Engineering, Procurement & Construction Management:			195,106
Total Capital:			\$1,800,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	631,241	ton	\$1,767,476
Soil Hauling	631,241	ton	\$2,958,944
Tipping Fees (non-TSCA)	623,527	ton	\$26,811,672
Tipping Fees (TSCA)	7,714	ton	\$424,272
Direct Capital:			\$31,962,363
Engineering, Procurement & Construction Management:			3,835,484
Total Capital:			\$35,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$102,500,000

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Lime Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	697	acre	\$11,152,000
Dredging - 12 hour shifts	1245	Day	\$7,096,500
Dredge Monitoring (Water Quality)	1245	Day	\$3,735,000
Sediment Removal QA	1245	Day	\$1,494,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$24,447,500
Engineering, Procurement & Construction Management:			2,933,700
Contractor Overhead/Profit:			3,667,125
Total Capital:			\$31,000,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

CDF CONSTRUCTION - MENASHA

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	27,778	sf	\$50,000
Shot Rock/Rip Rap	9,200	lf	\$7,360,000
Sheetpile Placement	276,000	sf	\$5,244,000
Clean Soil Cap	170,000	cy	\$1,700,000
Seeding	250,000	sy	\$250,000
Mitigation	52	acre	\$516,529
Direct Capital:			\$15,120,529
Engineering, Procurement & Construction Management:			1,814,463
Total Capital:			\$16,934,992
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	338,700	\$5,096,178
Total Present Worth, Longer Term O&M Costs			\$15,026,734
Total Project Capital and O&M Cost			\$32,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	1,215,263,074	gal	\$486,105
Water Treatment QA	1,764	day	\$352,800
Direct Capital:			\$1,619,999
Engineering, Procurement & Construction Management:			194,400
Total Capital:			\$1,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$110,300,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	697	acre	\$11,152,000
Dredging - 12 hour shifts	1260	Day	\$7,182,000
Dredge Monitoring (Water Quality)	1260	Day	\$3,780,000
Sediment Removal QA	1260	Day	\$1,512,000
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$25,196,000
Engineering, Procurement & Construction Management:			3,023,520
Contractor Overhead/Profit:			3,779,400
Total Capital:			\$32,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	1,002,963,239	gal	\$401,185
Water Treatment QA	1,764	day	\$352,800
Direct Capital:			\$1,445,081
Engineering, Procurement & Construction Management:			173,410
Total Capital:			\$1,600,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units	Cost
Sediment Treatment	1,578,103	ton	\$42,608,787
Soil Loading	1,578,103	ton	\$4,418,689
Soil Hauling	1,578,103	ton	\$1,849,340
Direct Capital:			\$48,876,816
Engineering, Procurement & Construction Management:			\$5,865,218
Total Capital:			\$54,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$96,000,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge to CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Cement Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	745,828	tons	\$4,474,967
Sand Placement	532,734	cy	\$3,196,405
Cobble Purchase and Placement	319,640	cy	\$9,589,215
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$17,560,587
Engineering, Procurement & Construction Management:			2,107,270
Total Capital:			\$19,667,857
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$393,357	\$5,918,568
Total Present Worth, Longer Term O&M Costs			\$11,937,087
Total Project Capital and O&M Cost			\$31,600,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	697	acre	\$11,152,000
Dredging - 12 hour shifts	937	Day	\$5,340,900
Dredge Monitoring (Water Quality)	937	Day	\$2,811,000
Sediment Removal QA	937	Day	\$1,124,400
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$21,998,300
Engineering, Procurement & Construction Management:			2,639,796
Contractor Overhead/Profit:			3,299,745
Total Capital:			\$27,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	914,283,237	gal	\$365,713
Water Treatment QA	1,333	Day	\$266,600
Direct Capital:			\$1,413,407
Engineering, Procurement & Construction Management:			169,609
Total Capital:			\$1,600,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$106,600,000

**BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE LAKE BUTTE DES MORTS
Action Level - 500 ppb**

Material Handling Assumptions:

Volume > 500 ppb	1,023,621	cy	625	ac	781,390	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	1,689,173	cy			1,289,445	m3	
Volume > 250 ppb	1,322,818	cy			1,009,785	m3	
Volume > 1,000 ppb	784,192	cy			598,620	m3	
Volume > 5,000 ppb	281,689	cy			215,030	m3	
Volume > 50,000 ppb	16,165	cy			12,340	m3	
Solids Specific Gravity	2.51						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.3%	v/v	0.99	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density (passive pond)	20%	w/w	9.1%	v/v	0.96	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	28.5%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.8%	w/w	60.0%	v/v	1.35	tons per cy	
Arrowhead/Menasha CDF Capacity	1,406,932	cy		in situ	1,337,963	m3	
HTTD Treatment Capacity	1,099,327	cy		in situ	1,650,000	tons	
Cap Volume	252,057	cy			192,410	m3	
Vitrification Treatment Capacity	4,496,073	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						Not Used
Sales Tax	5.5%						
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Debris Sweep	\$16,000	per acre					Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					
Hydraulic - 10-inch Cutterhead							
Site Preparation	\$100,000	per dredge launch site					pj
Mobilization - Equipment	\$135,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift					Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					pj
Mechanical - 3 cy bucket							
Dock Construction	\$400,000	LS					pj
Mobilization - Equipment	\$455,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS					Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea					Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$9,000	per shift					Ogden Beeman
Dredge Rate	630	cy in situ per 10 hour shift					Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area					pj
Free Water per cy Dredged (10%)	20	gal					Ogden Beeman
Offload Crane Mobilization	\$50,000	LS					pj
Site Restoration	\$75,000	LS					pj
High Temperature Thermal Desorption							
Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					
Vitrification							
Vitrification (unit cost incl Cap and Op Costs)	\$27.0	per ton (250 glass ton per day melter unit)					Unit Cost Study- Minergy
Capping							
Mobilization/Site Prep	\$200,000						Ogden Beeman
Area	7,636,809	sf	709,500		m2		
Sand Cap Depth	1.7	feet					
Sand Placement	\$6	per cy					Ogden Beeman
Sand Purchase	\$6	per ton					Ole
Sand Density	1.4	tons per cy					
Armored Cap Depth	1.0	feet					
Cobbles	\$30	per cy					Means
Cap Placement QA	\$100,000	LS					Ogden Beeman
Long-term O&M	2%	of capital					pj
Long-term Monitoring	\$400,000	per year					Anne LTM

Nearshore CDF		Arrowhead		Menasha	
Land Lease or Purchase	\$1.8	per sf		\$1.8	Ole
Length	8,000	lf		9,200	Baird
Capping Volume	190,000	cy		170,000	Baird
Seeding Area	280,000	sy		250,000	Baird
Sheetpile Wall Length	8,000	lf		9,200	Baird
Sheetpile Depth	30	ft		30	based on bathymetry
Sheetpile Cost	\$19	per sf		\$19	pj
Shot Rock Berm	\$650	per lf		\$550	Baird
Rip Rap	\$215	per lf		\$250	Baird
Place Treated Material	\$2	per cy		\$2	pj
Clean Soil Cap	\$10	per cy		\$10	Baird
Seeding	\$1	per sy		\$1	Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	644,791	sf			2 days slurry + 13 wk solids * 2 cell
Perimeter	3,212	lf			assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			pj
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Water Treatment					
Flow Rate (passive dewatering)	395	gpm			assume operate 24/7
Unit, Purchase (passive dewatering)	\$691,096	LS			pj
Flow Rate (mechanical dewatering)	484	gpm			
Unit, Purchase (mechanical dewatering)	\$781,094	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Disposal					
Off-Site Disposal					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Institutional Controls					
Public Education Program	\$100,000				pj
O&M Plans	\$20,000				pj
Deed Restrictions	\$5,000				pj
Annual Costs					
Public Education Program	\$30,000				pj
Maintaining O&M Plans	\$800				pj
Reporting	\$20,000				pj
Long-term Monitoring	\$600,000				Anne LTM
Long-term Monitoring (no action)	\$300,000				Anne LTM

ALTERNATIVE A: No Action

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery

MONITORING/INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Off-site Disposal (Passive Dewatering)

SEDIMENT REMOVAL (CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	625	acre	\$10,000,000
Dredging - 12 hour shifts	975	Day	\$5,557,500
Dredge Monitoring (Water Quality)	975	Day	\$2,925,000
Sediment Removal QA	975	Day	\$1,170,000
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$21,222,500
Engineering, Procurement & Construction Management:			2,546,700
Contractor Overhead/Profit:			3,183,375
Total Capital:			\$27,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	776,111,197	gal	\$310,444
Water Treatment QA	1,365	day	\$273,000
Direct Capital:			\$1,274,540
Engineering, Procurement & Construction Management:			152,945
Total Capital:			\$1,400,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	1,221,165	ton	\$30,529,125
Lime Purchase	122,117	ton	\$7,327,020
Soil Loading	1,221,165	ton	\$3,419,262
Soil Hauling	1,221,165	ton	\$5,724,211
Tipping Fees (non-TSCA)	1,201,880	ton	\$51,680,836
Tipping Fees (TSCA)	19,285	ton	\$1,060,680
Direct Capital:			\$99,741,134
Engineering, Procurement & Construction Management:			11,968,936
Total Capital:			\$111,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$147,800,000

ALTERNATIVE C2: Dredge Sediment With Off-site Disposal (Mechanical Dewatering)

SEDIMENT REMOVAL (CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	625	acre	\$10,000,000
Dredging - 12 hour shifts	975	Day	\$5,557,500
Dredge Monitoring (Water Quality)	975	Day	\$2,925,000
Sediment Removal QA	975	Day	\$1,170,000
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$21,222,500
Engineering, Procurement & Construction Management:			2,546,700
Contractor Overhead/Profit:			3,183,375
Total Capital:			\$27,000,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	244,233	bdh	\$19,538,640
Direct Capital:			\$19,638,640
Engineering, Procurement & Construction Management:			2,356,637
Total Capital:			\$22,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	951,771,083	gal	\$380,708
Water Treatment QA	1,365	day	\$273,000
Direct Capital:			\$1,434,802
Engineering, Procurement & Construction Management:			172,176
Total Capital:			\$1,600,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	488,466	ton	\$1,367,705
Soil Hauling	488,466	ton	\$2,289,684
Tipping Fees (non-TSCA)	480,752	ton	\$20,672,334
Tipping Fees (TSCA)	7,714	ton	\$424,272
Direct Capital:			\$24,753,995
Engineering, Procurement & Construction Management:			2,970,479
Total Capital:			\$27,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$82,800,000

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Lime Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	625	acre	\$10,000,000
Dredging - 12 hour shifts	960	Day	\$5,472,000
Dredge Monitoring (Water Quality)	960	Day	\$2,880,000
Sediment Removal QA	960	Day	\$1,152,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$20,474,000
Engineering, Procurement & Construction Management:			2,456,880
Contractor Overhead/Profit:			3,071,100
Total Capital:			\$26,000,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

CDF CONSTRUCTION - MENASHA

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	27,778	sf	\$50,000
Shot Rock/Rip Rap	9,200	lf	\$7,360,000
Sheetpile Placement	276,000	sf	\$5,244,000
Clean Soil Cap	170,000	cy	\$1,700,000
Seeding	250,000	sy	\$250,000
Mitigation	52	acre	\$516,529
Direct Capital:			\$15,120,529
Engineering, Procurement & Construction Management:			1,814,463
Total Capital:			\$16,934,992
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	338,700	\$5,096,178
Total Present Worth, Longer Term O&M Costs			\$15,026,734
Total Project Capital and O&M Cost			\$32,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	937,066,839	gal	\$374,827
Water Treatment QA	1,365	day	\$273,000
Direct Capital:			\$1,428,921
Engineering, Procurement & Construction Management:			171,470
Total Capital:			\$1,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$105,100,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	625	acre	\$10,000,000
Dredging - 12 hour shifts	975	Day	\$5,557,500
Dredge Monitoring (Water Quality)	975	Day	\$2,925,000
Sediment Removal QA	975	Day	\$1,170,000
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$21,222,500
Engineering, Procurement & Construction Management:			2,546,700
Contractor Overhead/Profit:			3,183,375
Total Capital:			\$27,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	776,111,197	gal	\$310,444
Water Treatment QA	1,365	day	\$273,000
Direct Capital:			\$1,274,540
Engineering, Procurement & Construction Management:			152,945
Total Capital:			\$1,400,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units	Cost
Sediment Treatment	1,221,165	ton	\$32,971,455
Soil Loading	1,221,165	ton	\$3,419,262
Soil Hauling	1,221,165	ton	\$1,431,053
Direct Capital:			\$37,821,769
Engineering, Procurement & Construction Management:			\$4,538,612
Total Capital:			\$42,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$78,500,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge to CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Cement Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	659,971	tons	\$3,959,827
Sand Placement	471,408	cy	\$2,828,448
Cobble Purchase and Placement	282,845	cy	\$8,485,343
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$15,573,617
Engineering, Procurement & Construction Management:			1,868,834
Total Capital:			\$17,442,452
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$348,849	\$5,248,886
Total Present Worth, Longer Term O&M Costs			\$11,267,405
Total Project Capital and O&M Cost			\$28,700,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	625	acre	\$10,000,000
Dredging - 12 hour shifts	720	Day	\$4,104,000
Dredge Monitoring (Water Quality)	720	Day	\$2,160,000
Sediment Removal QA	720	Day	\$864,000
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$18,698,000
Engineering, Procurement & Construction Management:			2,243,760
Contractor Overhead/Profit:			2,804,700
Total Capital:			\$23,700,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	702,702,086	gal	\$281,081
Water Treatment QA	1,029	Day	\$205,800
Direct Capital:			\$1,267,975
Engineering, Procurement & Construction Management:			152,157
Total Capital:			\$1,400,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$99,300,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE LAKE BUTTE DES MORTS
Action Level - 1,000 ppb

Material Handling Assumptions:

Volume > 1000 ppb	784,192	cy	526	ac	598,620	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	1,689,173	cy			1,289,445	m3	
Volume > 250 ppb	1,322,818	cy			1,009,785	m3	
Volume > 500 ppb	1,023,621	cy			781,390	m3	
Volume > 5,000 ppb	281,689	cy			215,030	m3	
Volume > 50,000 ppb	16,165	cy			12,340	m3	
Solids Specific Gravity	2.51						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.3%	v/v	0.99	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density (passive pond)	20%	w/w	9.1%	v/v	0.96	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	28.5%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.8%	w/w	60.0%	v/v	1.35	tons per cy	
Arrowhead/Menasha CDF Capacity	1,406,932	cy		in situ	1,337,963	m3	
HTTD Treatment Capacity	1,099,327	cy		in situ	1,650,000	tons	
Cap Volume	148,646	cy			113,470	m3	
Vitrification Treatment Capacity	4,496,073	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						Not Used
Sales Tax	5.5%						
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Debris Sweep	\$16,000	per acre					Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					
Hydraulic - 10-inch Cutterhead							
Site Preparation	\$100,000	per dredge launch site					pj
Mobilization - Equipment	\$135,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift					Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					pj
Mechanical - 3 cy bucket							
Dock Construction	\$400,000	LS					pj
Mobilization - Equipment	\$455,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS					Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea					Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$9,000	per shift					Ogden Beeman
Dredge Rate	630	cy in situ per 10 hour shift					Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area					pj
Free Water per cy Dredged (10%)	20	gal					Ogden Beeman
Offload Crane Mobilization	\$50,000	LS					pj
Site Restoration	\$75,000	LS					pj
High Temperature Thermal Desorption							
Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					
Vitrification							
Vitrification (unit cost incl Cap and Op Costs)	\$27.0	per ton (250 glass ton per day melter unit)					Unit Cost Study- Minergy
Capping							
Mobilization/Site Prep	\$200,000						Ogden Beeman
Area	5,884,487	sf	546,700			m2	
Sand Cap Depth	1.7	feet					
Sand Placement	\$6	per cy					Ogden Beeman
Sand Purchase	\$6	per ton					Ole
Sand Density	1.4	tons per cy					
Armored Cap Depth	1.0	feet					
Cobbles	\$30	per cy					Means
Cap Placement QA	\$100,000	LS					Ogden Beeman
Long-term O&M	2%	of capital					pj
Long-term Monitoring	\$400,000	per year					Anne LTM

Nearshore CDF		Arrowhead		Menasha	
Land Lease or Purchase	\$1.8	per sf		\$1.8	Ole
Length	8,000	lf		9,200	Baird
Capping Volume	190,000	cy		170,000	Baird
Seeding Area	280,000	sy		250,000	Baird
Sheetpile Wall Length	8,000	lf		9,200	Baird
Sheetpile Depth	30	ft		30	based on bathymetry
Sheetpile Cost	\$19	per sf		\$19	pj
Shot Rock Berm	\$650	per lf		\$550	Baird
Rip Rap	\$215	per lf		\$250	Baird
Place Treated Material	\$2	per cy		\$2	pj
Clean Soil Cap	\$10	per cy		\$10	Baird
Seeding	\$1	per sy		\$1	Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	644,791	sf			2 days slurry + 13 wk solids * 2 cell
Perimeter	3,212	lf			assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			pj
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Water Treatment					
Flow Rate (passive dewatering)	395	gpm			assume operate 24/7
Unit, Purchase (passive dewatering)	\$691,096	LS			pj
Flow Rate (mechanical dewatering)	484	gpm			
Unit, Purchase (mechanical dewatering)	\$781,094	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Disposal					
Off-Site Disposal					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Institutional Controls					
Public Education Program	\$100,000				pj
O&M Plans	\$20,000				pj
Deed Restrictions	\$5,000				pj
Annual Costs					
Public Education Program	\$30,000				pj
Maintaining O&M Plans	\$800				pj
Reporting	\$20,000				pj
Long-term Monitoring	\$600,000				Anne LTM
Long-term Monitoring (no action)	\$300,000				Anne LTM

ALTERNATIVE A: No Action

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Off-site Disposal (Passive Dewatering)**SEDIMENT REMOVAL (CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	526	acre	\$8,416,000
Dredging - 12 hour shifts	747	Day	\$4,257,900
Dredge Monitoring (Water Quality)	747	Day	\$2,241,000
Sediment Removal QA	747	Day	\$896,400
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$17,381,300
Engineering, Procurement & Construction Management:			2,085,756
Contractor Overhead/Profit:			2,607,195
Total Capital:			\$22,100,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	594,575,928	gal	\$237,830
Water Treatment QA	1,046	day	\$209,200
Direct Capital:			\$1,138,126
Engineering, Procurement & Construction Management:			136,575
Total Capital:			\$1,300,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	935,530	ton	\$23,388,250
Lime Purchase	93,553	ton	\$5,613,180
Soil Loading	935,530	ton	\$2,619,484
Soil Hauling	935,530	ton	\$4,385,297
Tipping Fees (non-TSCA)	916,245	ton	\$39,398,531
Tipping Fees (TSCA)	19,285	ton	\$1,060,680
Direct Capital:			\$76,465,422
Engineering, Procurement & Construction Management:			9,175,851
Total Capital:			\$85,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$116,700,000

ALTERNATIVE C2: Dredge Sediment With Off-site Disposal (Mechanical Dewatering)

SEDIMENT REMOVAL (CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	526	acre	\$8,416,000
Dredging - 12 hour shifts	747	Day	5.746153846 \$4,257,900
Dredge Monitoring (Water Quality)	747	Day	\$2,241,000
Sediment Removal QA	747	Day	\$896,400
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$17,381,300
Engineering, Procurement & Construction Management:			2,085,756
Contractor Overhead/Profit:			2,607,195
Total Capital:			\$22,100,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	187,106	bdh	\$14,968,480
Direct Capital:			\$15,068,480
Engineering, Procurement & Construction Management:			1,808,218
Total Capital:			\$16,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	729,148,320	gal	\$291,659
Water Treatment QA	1,046	day	\$209,200
Direct Capital:			\$1,281,953
Engineering, Procurement & Construction Management:			153,834
Total Capital:			\$1,400,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	374,212	ton	\$1,047,794
Soil Hauling	374,212	ton	\$1,754,119
Tipping Fees (non-TSCA)	366,498	ton	\$15,759,412
Tipping Fees (TSCA)	7,714	ton	\$424,272
Direct Capital:			\$18,985,597
Engineering, Procurement & Construction Management:			2,278,272
Total Capital:			\$21,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$66,200,000

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Lime Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	526	acre	\$8,416,000
Dredging - 12 hour shifts	732	Day	\$4,172,400
Dredge Monitoring (Water Quality)	732	Day	\$2,196,000
Sediment Removal QA	732	Day	\$878,400
Site Restoration	1	LS	\$600,000
Direct Capital:			\$16,632,800
Engineering, Procurement & Construction Management:			1,995,936
Contractor Overhead/Profit:			2,494,920
Total Capital:			\$21,100,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	714,444,075	gal	\$285,778
Water Treatment QA	1,046	day	\$209,200
Direct Capital:			\$1,276,072
Engineering, Procurement & Construction Management:			153,129
Total Capital:			\$1,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$68,000,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	526	acre	\$8,416,000
Dredging - 12 hour shifts	747	Day	\$4,257,900
Dredge Monitoring (Water Quality)	747	Day	\$2,241,000
Sediment Removal QA	747	Day	\$896,400
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$17,381,300
Engineering, Procurement & Construction Management:			2,085,756
Contractor Overhead/Profit:			2,607,195
Total Capital:			\$22,100,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	594,575,928	gal	\$237,830
Water Treatment QA	1,046	day	\$209,200
Direct Capital:			\$1,138,126
Engineering, Procurement & Construction Management:			136,575
Total Capital:			\$1,300,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units	Cost
Sediment Treatment	935,530	ton	\$25,259,310
Soil Loading	935,530	ton	\$2,619,484
Soil Hauling	935,530	ton	\$1,096,324
Direct Capital:			\$28,975,118
Engineering, Procurement & Construction Management:			\$3,477,014
Total Capital:			\$32,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$63,600,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge to CDF and Off-site Disposal**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Cement Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	508,536	tons	\$3,051,215
Sand Placement	363,240	cy	\$2,179,440
Cobble Purchase and Placement	217,944	cy	\$6,538,319
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$12,068,973
Engineering, Procurement & Construction Management:			1,448,277
Total Capital:			\$13,517,250
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$270,345	\$4,067,691
Total Present Worth, Longer Term O&M Costs			\$10,086,210
Total Project Capital and O&M Cost			\$23,600,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	526	acre	\$8,416,000
Dredging - 12 hour shifts	590	Day	\$3,363,000
Dredge Monitoring (Water Quality)	590	Day	\$1,770,000
Sediment Removal QA	590	Day	\$708,000
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$15,827,000
Engineering, Procurement & Construction Management:			1,899,240
Contractor Overhead/Profit:			2,374,050
Total Capital:			\$20,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	576,232,088	gal	\$230,493
Water Treatment QA	848	Day	\$169,600
Direct Capital:			\$1,181,187
Engineering, Procurement & Construction Management:			141,742
Total Capital:			\$1,300,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$90,500,000

**BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE LAKE BUTTE DES MORTS
Action Level - 5,000 ppb**

Material Handling Assumptions:

Volume > 5000 ppb	281,689	cy	174	ac	215,030	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	1,689,173	cy			1,289,445	m3	
Volume > 250 ppb	1,322,818	cy			1,009,785	m3	
Volume > 500 ppb	1,128,565	cy			781,390	m3	
Volume > 1,000 ppb	784,192	cy			598,620	m3	
Volume > 50,000 ppb	16,165	cy			12,340	m3	
Solids Specific Gravity	2.51						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.3%	v/v	0.99	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density (passive pond)	20%	w/w	9.1%	v/v	0.96	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	28.5%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.8%	w/w	60.0%	v/v	1.35	tons per cy	
Arrowhead/Menasha CDF Capacity	1,406,932	cy		in situ	1,337,963	m3	
HTTD Treatment Capacity	1,099,327	cy		in situ	1,650,000	tons	
Cap Volume	59,055	cy			45,080	m3	
Vitrification Treatment Capacity	4,496,073	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%	Not Used
Sales Tax	5.5%	
Engineering, Procurement and Construction Mgmt	12.0%	
Contractor Overhead and Profit - Dredging Only	15.0%	

Dredging

Debris Sweep	\$16,000	per acre	Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day	
Sediment Removal QA	\$1,200	per day	
Hydraulic - 10-inch Cutterhead			
Site Preparation	\$100,000	per dredge launch site	pj
Mobilization - Equipment	\$135,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000		Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift	Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift	Ogden Beeman
Site Restoration	\$600,000	per dredge launch site	pj
Mechanical - 3 cy bucket			
Dock Construction	\$400,000	LS	pj
Mobilization - Equipment	\$455,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS	Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea	Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$9,000	per shift	Ogden Beeman
Dredge Rate	630	cy in situ per 10 hour shift	Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area	pj
Free Water per cy Dredged (10%)	20	gal	Ogden Beeman
Offload Crane Mobilization	\$50,000	LS	pj
Site Restoration	\$75,000	LS	pj
High Temperature Thermal Desorption			
Setup Staging Area	\$50,000		pj
Mobilization/Site Prep	\$150,000		Maxymillian
Sediment Treatment QA	\$2	per ton	
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1	
Sand Purchase and Deliver	\$6	per ton	Ole
Blending	\$25	per ton	Ole
HTTD (includes off-gas treatment)	\$75	per ton	Maxymillian
Stack Testing	\$50,000	LS	Maxymillian
Place Treated Material	\$3	per ton	
Vitrification			
Vitrification (unit cost incl Cap and Op Costs)	\$27.0	per ton (250 glass ton per day melter unit)	Unit Cost Study- Minergy
Capping			
Mobilization/Site Prep	\$200,000		Ogden Beeman
Area	1,791,071	sf	166,400 m2
Sand Cap Depth	1.7	feet	
Sand Placement	\$6	per cy	Ogden Beeman
Sand Purchase	\$6	per ton	Ole
Sand Density	1.4	tons per cy	
Armored Cap Depth	1.0	feet	
Cobbles	\$30	per cy	Means
Cap Placement QA	\$100,000	LS	Ogden Beeman
Long-term O&M	2%	of capital	pj
Long-term Monitoring	\$400,000	per year	Anne LTM

Nearshore CDF		Arrowhead		Menasha	
Land Lease or Purchase	\$1.8	per sf		\$1.8	Ole
Length	8,000	lf		9,200	Baird
Capping Volume	190,000	cy		170,000	Baird
Seeding Area	280,000	sy		250,000	Baird
Sheetpile Wall Length	8,000	lf		9,200	Baird
Sheetpile Depth	30	ft		30	based on bathymetry
Sheetpile Cost	\$19	per sf		\$19	pj
Shot Rock Berm	\$650	per lf		\$550	Baird
Rip Rap	\$215	per lf		\$250	Baird
Place Treated Material	\$2	per cy		\$2	pj
Clean Soil Cap	\$10	per cy		\$10	Baird
Seeding	\$1	per sy		\$1	Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	644,791	sf			2 days slurry + 13 wk solids * 2 cell
Perimeter	3,212	lf			assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			pj
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Water Treatment					
Flow Rate (passive dewatering)	395	gpm			assume operate 24/7
Unit, Purchase (passive dewatering)	\$691,096	LS			pj
Flow Rate (mechanical dewatering)	484	gpm			
Unit, Purchase (mechanical dewatering)	\$781,094	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Disposal					
Off-Site Disposal					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Institutional Controls					
Public Education Program	\$100,000				pj
O&M Plans	\$20,000				pj
Deed Restrictions	\$5,000				pj
Annual Costs					
Public Education Program	\$30,000				pj
Maintaining O&M Plans	\$800				pj
Reporting	\$20,000				pj
Long-term Monitoring	\$600,000				Anne LTM
Long-term Monitoring (no action)	\$300,000				Anne LTM

ALTERNATIVE A: No Action

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Off-site Disposal (Passive Dewatering)**SEDIMENT REMOVAL (CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	174	acre	\$2,784,000
Dredging - 12 hour shifts	269	Day	\$1,533,300
Dredge Monitoring (Water Quality)	269	Day	\$807,000
Sediment Removal QA	269	Day	\$322,800
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$7,017,100
Engineering, Procurement & Construction Management:			842,052
Contractor Overhead/Profit:			1,052,565
Total Capital:			\$8,900,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	213,577,331	gal	\$85,431
Water Treatment QA	376	day	\$75,200
Direct Capital:			\$851,727
Engineering, Procurement & Construction Management:			102,207
Total Capital:			\$1,000,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	336,052	ton	\$8,401,300
Lime Purchase	33,606	ton	\$2,016,360
Soil Loading	336,052	ton	\$940,946
Soil Hauling	336,052	ton	\$1,575,244
Tipping Fees (non-TSCA)	316,767	ton	\$13,620,975
Tipping Fees (TSCA)	19,285	ton	\$1,060,682
Direct Capital:			\$27,615,507
Engineering, Procurement & Construction Management:			3,313,861
Total Capital:			\$30,900,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$48,500,000

ALTERNATIVE C2: Dredge Sediment With Off-site Disposal (Mechanical Dewatering)

SEDIMENT REMOVAL (CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	174	acre	\$2,784,000
Dredging - 12 hour shifts	269	Day	2.069230769 \$1,533,300
Dredge Monitoring (Water Quality)	269	Day	\$807,000
Sediment Removal QA	269	Day	\$322,800
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$7,017,100
Engineering, Procurement & Construction Management:			842,052
Contractor Overhead/Profit:			1,052,565
Total Capital:			\$8,900,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	67,210	bdh	\$5,376,820
Direct Capital:			\$5,476,820
Engineering, Procurement & Construction Management:			657,218
Total Capital:			\$6,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	261,917,015	gal	\$104,767
Water Treatment QA	376	day	\$75,200
Direct Capital:			\$961,061
Engineering, Procurement & Construction Management:			115,327
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	134,421	ton	\$376,377
Soil Hauling	134,421	ton	\$630,096
Tipping Fees (non-TSCA)	126,706	ton	\$5,448,378
Tipping Fees (TSCA)	7,714	ton	\$424,272
Direct Capital:			\$6,879,124
Engineering, Procurement & Construction Management:			825,495
Total Capital:			\$7,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$28,300,000

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Lime Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	174	acre	\$2,784,000
Dredging - 12 hour shifts	253	Day	\$1,442,100
Dredge Monitoring (Water Quality)	253	Day	\$759,000
Sediment Removal QA	253	Day	\$303,600
Site Restoration	1	LS	\$600,000
Direct Capital:			\$6,258,700
Engineering, Procurement & Construction Management:			751,044
Contractor Overhead/Profit:			938,805
Total Capital:			\$7,900,000

CDF CONSTRUCTION - ARROWHEAD

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,520,000	sf	\$4,536,000
Shot Rock/Rip Rap	8,000	lf	\$6,920,000
Sheetpile Placement	240,000	sf	\$4,560,000
Clean Soil Cap	190,000	cy	\$1,900,000
Seeding	280,000	sy	\$280,000
Mitigation	58	acre	\$578,512
Direct Capital:			\$18,774,512
Engineering, Procurement & Construction Management:			2,252,941
Total Capital:			\$21,027,454

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	420,549	\$6,327,706
Total Present Worth, Longer Term O&M Costs			\$16,258,262
Total Project Capital and O&M Cost			\$37,300,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	247,212,770	gal	\$98,885
Water Treatment QA	376	day	\$75,200
Direct Capital:			\$955,179
Engineering, Procurement & Construction Management:			114,621
Total Capital:			\$1,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$54,500,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	174	acre	\$2,784,000
Dredging - 12 hour shifts	269	Day	\$1,533,300
Dredge Monitoring (Water Quality)	269	Day	\$807,000
Sediment Removal QA	269	Day	\$322,800
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$7,017,100
Engineering, Procurement & Construction Management:			842,052
Contractor Overhead/Profit:			1,052,565
Total Capital:			\$8,900,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	644,791	sf	\$1,160,624
Mobilization	1	LS	\$20,000
Clear and Grub	644,791	sf	\$29,605
Berm Construction	33,309	cy	\$199,855
Rough Grading	644,791	sf	\$161,198
Liner Placement	644,791	sf	\$967,187
Demob/Disposal	1	LS	\$10,000
Regrade	33,309	cy	\$199,855
Seed/Sod	71,643	sy	\$71,643
Direct Capital:			\$2,819,968
Engineering, Procurement & Construction Management:			338,396
Total Capital:			\$3,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,096
Water Treatment (Includes Operator)	213,577,331	gal	\$85,431
Water Treatment QA	376	day	\$75,200
Direct Capital:			\$851,727
Engineering, Procurement & Construction Management:			102,207
Total Capital:			\$1,000,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units	Cost
Sediment Treatment	336,051	ton	\$9,073,384
Soil Loading	336,051	ton	\$940,944
Soil Hauling	336,051	ton	\$393,810
Direct Capital:			\$10,408,138
Engineering, Procurement & Construction Management:			\$1,248,977
Total Capital:			\$11,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$29,300,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge to CDF and Off-site Disposal**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$490,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	26	Day	\$234,000
Dredge Monitoring (Water Quality)	26	Day	\$78,000
Sediment Removal QA	26	Day	\$31,200
Offload Crane Mobilization	1	LS	\$50,000
Direct Capital:			\$1,358,200
Engineering, Procurement & Construction Management:			162,984
Contractor Overhead/Profit:			203,730
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	19,286	ton	\$482,150
Cement Purchase	1,929	ton	\$115,740
Soil Loading	19,286	ton	\$54,001
Soil Hauling	19,286	ton	\$90,403
Tipping Fees (TSCA)	19,286	ton	\$1,060,730
Direct Capital:			\$1,803,024
Engineering, Procurement & Construction Management:			216,363
Total Capital:			\$2,000,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	154,784	tons	\$928,704
Sand Placement	110,560	cy	\$663,360
Cobble Purchase and Placement	66,336	cy	\$1,990,079
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$3,882,142
Engineering, Procurement & Construction Management:			465,857
Total Capital:			\$4,347,999
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$86,960	\$1,308,426
Total Present Worth, Longer Term O&M Costs			\$7,326,945
Total Project Capital and O&M Cost			\$11,700,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$200,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	174	acre	\$2,784,000
Dredging - 12 hour shifts	197	Day	\$1,122,900
Dredge Monitoring (Water Quality)	197	Day	\$591,000
Sediment Removal QA	197	Day	\$236,400
Site Restoration	2	Each	\$1,200,000
Direct Capital:			\$6,304,300
Engineering, Procurement & Construction Management:			756,516
Contractor Overhead/Profit:			945,645
Total Capital:			\$8,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	484	gpm	\$781,094
Water Treatment (Includes Operator)	192,303,134	gal	\$76,921
Water Treatment QA	297	Day	\$59,400
Direct Capital:			\$917,415
Engineering, Procurement & Construction Management:			110,090
Total Capital:			\$1,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$66,200,000

Table 7-6 Cost Summary for Remedial Alternatives - Appleton to Little Rapids**125 ppb**

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C	182,450	\$10,100,000	---	---	\$3,000,000	\$900,000	---	---	\$19,800,000	\$4,500,000	\$38,300,000	\$7,660,000	\$45,960,000
E	182,450	\$10,100,000	---	---	\$3,000,000	\$900,000	\$7,700,000	---	---	\$4,500,000	\$26,200,000	\$5,240,000	\$31,440,000

250 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C	80,611	\$8,000,000	---	---	\$3,000,000	\$800,000	---	---	\$8,700,000	\$4,500,000	\$25,000,000	\$5,000,000	\$30,000,000
E	80,611	\$8,000,000	---	---	\$3,000,000	\$800,000	\$3,400,000	---	---	\$4,500,000	\$19,700,000	\$3,940,000	\$23,640,000

500 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C	56,998	\$7,200,000	---	---	\$3,000,000	\$800,000	---	---	\$6,200,000	\$4,500,000	\$21,700,000	\$4,340,000	\$26,040,000
E	56,998	\$7,200,000	---	---	\$3,000,000	\$800,000	\$2,400,000	---	---	\$4,500,000	\$17,900,000	\$3,580,000	\$21,480,000

1000 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C	46,178	\$6,800,000	---	---	\$3,000,000	\$800,000	---	---	\$5,000,000	\$4,500,000	\$20,100,000	\$4,020,000	\$24,120,000
E	46,178	\$6,800,000	---	---	\$3,000,000	\$800,000	\$2,000,000	---	---	\$4,500,000	\$17,100,000	\$3,420,000	\$20,520,000

5000 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C	20,148	\$6,000,000	---	---	\$3,000,000	\$800,000	---	---	\$2,200,000	\$4,500,000	\$16,500,000	\$3,300,000	\$19,800,000
E	20,148	\$6,000,000	---	---	\$3,000,000	\$800,000	\$900,000	---	---	\$4,500,000	\$15,200,000	\$3,040,000	\$18,240,000

**BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
APPLETON TO LITTLE RAPIDS
Action Level - 125 ppb**

Material Handling Assumptions:

Volume > 125 ppb	182,450	cy	119	ac	139,275	m3	Acres corresponds to dredge footprint area
Volume > 250 ppb	80,611	cy			61,535	m3	
Volume > 500 ppb	56,998	cy			43,510	m3	
Volume > 1,000 ppb	46,178	cy			35,250	m3	
Volume > 5000 ppb	20,148	cy			15,380	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.4						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.7%	v/v	0.98	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density	20%	w/w	9.4%	v/v	0.95	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	29.4%	v/v	1.19	tons per cy	Foth & VanDyke
Treated Density	93.5%	w/w	60.0%	v/v	1.30	tons per cy	
HTTD Treatment Capacity	1,264,377	cy		in situ	1,650,000	tons	
Vitrification Treatment Capacity	1,328,888	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%					
Sales Tax	5.5%					Not Used
Engineering, Procurement and Construction Mgmt	12.0%					
Contractor Overhead and Profit - Dredging Only	15.0%					

Dredging

Debris Sweep	\$16,000	per acre				Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day				
Sediment Removal QA	\$1,200	per day				

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site				pj
Mobilization - Equipment	\$135,000	per dredge				Ogden Beeman
Mobilization - Silt Curtain	\$35,000					Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift				Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift				Ogden Beeman
Site Restoration	\$600,000	per dredge launch site				pj

High Temperature Thermal Desorption

Setup Staging Area	\$50,000					pj
Mobilization/Site Prep	\$150,000					Maxymillian
Sediment Treatment QA	\$2	per ton				
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1				
Sand Purchase and Deliver	\$6	per ton				Ole
Blending	\$25	per ton				Ole
HTTD (includes off-gas treatment)	\$75	per ton				Maxymillian
Stack Testing	\$50,000	LS				Maxymillian
Place Treated Material	\$3	per ton				

Solidification

Percent Lime	10.0%	(w/w)				Montgomery Watson
Lime	\$60	per ton	Mixing		\$25 per ton	pj, pug mill mixing

Vitrification

Vitrification	\$27.0	per ton (250 glass ton per dya melter unit)				Unit Cost Study- Minergy
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Dewatering - Upland Pond (2 cells)

Land Lease or Purchase	\$1.80	per sf				Ole
Area	608,771	sf	13.97546543			2 days slurry + 13 wk solids * 2 cell
Perimeter	3,121	lf				assume square
Depth of Material in Dewatering Cell	8	feet				based on size at Arrowhead Park
Cell Retention Time	24	hours				Not Used
Cell Depth	10	feet				
Mobilization	\$20,000	LS				pj
Clear and Grub	\$2,000	per acre				pj
Berm Volume	10.4	cy per lf				2:1 slope, 8-foot top
Berm Construction	\$6	per cy				pj
Rough Grading	\$0.25	per sf				pj
Asphalt Liner	\$1.50	per sf				pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS				pj
Regrade Berm Soils	\$6	per cy				pj
Seed/Sod	\$1	per sy				Baird

Dewatering - Mechanical

Mobilization	\$100,000					pj
Holding Pond-Centrifuge	\$80	per bone dry ton				Global Dewatering

Water Treatment

Flow Rate	395	gpm				assume operate 24/7
Unit, Purchase	\$691,235	LS				pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons				
Water Treatment QA	\$200	per day				
Flow Rate (mechanical dewatering)	484	gpm				pj
Unit, Purchase (mechanical dewatering)	\$780,778	LS				pj, 1 sample/day

Disposal

Off-Site Disposal

Load Soil for Hauling	\$2.80	per ton		pj
Round-trip Hauling	2	hours		pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours		pj
Tipping Fee (non-TSCA)	\$43	per ton		St. Paul
Tipping Fee (TSCA)	\$55	per ton		St. Paul
Truck Rate	\$75	per hour		pj
Truck Load	32	tons		pj

Institutional Controls

Public Education Program	\$100,000			pj
O&M Plans	\$20,000			pj
Deed Restrictions	\$5,000			pj
<u>Annual Costs</u>				
Public Education Program	\$30,000			pj
Maintaining O&M Plans	\$800			pj
Reporting	\$20,000			pj
Long-term Monitoring	\$600,000			Anne LTM
Long-term Monitoring (no action)	\$300,000			Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs			
Long-term Monitoring (no action)	40		\$300,000
			<u>\$4,513,889</u>
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs			
Long-term Monitoring	40		\$600,000
Public Education Program	40		\$9,027,778
Maintaining O&M Plans	40		\$30,000
Reporting	40		\$800
			<u>\$12,037</u>
Total Present Worth, Longer Term O&M Costs			\$300,926
			<u>\$9,792,130</u>
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C: Dredge Sediment With Off-site Disposal**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	5	Each	\$500,000
Mobilization - Equipment and Silt Curtain	5	LS	\$850,000
Debris Sweep	119	ac	\$1,904,000
Dredging - 12 hour shifts	174	Day	1.338461538 \$991,800
Dredge Monitoring (Water Quality)	174	Day	\$522,000
Sediment Removal QA	174	Day	\$208,800
Site Restoration	5	Each	\$3,000,000
Direct Capital:			\$7,976,600
Engineering, Procurement & Construction Management:			957,192
Contractor Overhead/Profit:			1,196,490
Total Capital:			\$10,100,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	608,771	sf	\$1,095,788
Mobilization	1	LS	\$20,000
Clear and Grub	608,771	sf	\$27,951
Berm Construction	32,365	cy	\$194,193
Rough Grading	608,771	sf	\$152,193
Liner Placement	608,771	sf	\$913,157
Demob/Disposal	1	LS	\$10,000
Regrade	32,365	cy	\$194,193
Seed/Sod	67,641	sy	\$67,641
Direct Capital:			\$2,675,115
Engineering, Procurement & Construction Management:			321,014
Total Capital:			\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,235
Water Treatment (Includes Operator)	138,380,705	gal	\$55,352
Water Treatment QA	244	day	\$48,800
Direct Capital:			\$795,388
Engineering, Procurement & Construction Management:			95,447
Total Capital:			\$900,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	216,541	ton	\$5,413,525
Lime Purchase	21,655	ton	\$1,299,300
Soil Loading	216,541	ton	\$606,315
Soil Hauling	216,541	ton	\$1,015,036
Tipping Fees (non-TSCA)	216,541	ton	\$9,311,263
Direct Capital:			\$17,645,439
Engineering, Procurement & Construction Management:			2,117,453
Total Capital:			\$19,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$38,300,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	5	Each	\$500,000
Mobilization - Equipment and Silt Curtain	5	LS	\$850,000
Debris Sweep	119	ac	\$1,904,000
Dredging - 12 hour shifts	174	Day	\$991,800
Dredge Monitoring (Water Quality)	174	Day	\$522,000
Sediment Removal QA	174	Day	\$208,800
Site Restoration	5	Each	\$3,000,000
Direct Capital:			\$7,976,600
Engineering, Procurement & Construction Management:			957,192
Contractor Overhead/Profit:			1,196,490
Total Capital:			\$10,100,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	608,771	sf	\$1,095,788
Mobilization	1	LS	\$20,000
Clear and Grub	608,771	sf	\$27,951
Berm Construction	32,365	cy	\$194,193
Rough Grading	608,771	sf	\$152,193
Liner Placement	608,771	sf	\$913,157
Demob/Disposal	1	LS	\$10,000
Regrade	32,365	cy	\$194,193
Seed/Sod	67,641	sy	\$67,641
Direct Capital:			\$2,675,115
Engineering, Procurement & Construction Management:			321,014
Total Capital:			\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,235
Water Treatment (Includes Operator)	138,380,705	gal	\$55,352
Water Treatment QA	244	day	\$48,800
Direct Capital:			\$795,388
Engineering, Procurement & Construction Management:			95,447
Total Capital:			\$900,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units	Cost
Sediment Treatment	216,541	ton	\$5,846,596
Soil Loading	216,541	ton	\$606,314
Soil Hauling	216,541	ton	\$253,758
Direct Capital:			\$6,706,668
Engineering, Procurement & Construction Management:			\$1,006,000
Total Capital:			\$7,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$26,200,000

**BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
APPLETON TO LITTLE RAPIDS
Action Level - 250 ppb**

Material Handling Assumptions:

Volume > 250 ppb	80,611	cy	73	ac	61,535	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	182,450	cy			139,275	m3	
Volume > 500 ppb	56,998	cy			43,510	m3	
Volume > 1,000 ppb	46,178	cy			35,250	m3	
Volume > 5000 ppb	20,148	cy			15,380	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.4						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.7%	v/v	0.98	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density	20%	w/w	9.4%	v/v	0.95	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	29.4%	v/v	1.19	tons per cy	Foth & VanDyke
Treated Density	93.5%	w/w	60.0%	v/v	1.30	tons per cy	
HTTD Treatment Capacity	1,264,377	cy		in situ	1,650,000	tons	
Vitrification Treatment Capacity	1,328,888	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%					
Sales Tax	5.5%					
Engineering, Procurement and Construction Mgmt	12.0%					Not Used
Contractor Overhead and Profit - Dredging Only	15.0%					

Dredging

Debris Sweep	\$16,000	per acre				Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day				
Sediment Removal QA	\$1,200	per day				

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site				pj
Mobilization - Equipment	\$135,000	per dredge				Ogden Beeman
Mobilization - Silt Curtain	\$35,000					Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift				Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift				Ogden Beeman
Site Restoration	\$600,000	per dredge launch site				pj

High Temperature Thermal Desorption

Setup Staging Area	\$50,000					pj
Mobilization/Site Prep	\$150,000					Maxymillian
Sediment Treatment QA	\$2	per ton				
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1				
Sand Purchase and Deliver	\$6	per ton				Ole
Blending	\$25	per ton				Ole
HTTD (includes off-gas treatment)	\$75	per ton				Maxymillian
Stack Testing	\$50,000	LS				Maxymillian
Place Treated Material	\$3	per ton				

Solidification

Percent Lime	10.0%	(w/w)				Montgomery Watson
Lime	\$60	per ton	Mixing		\$25 per ton	pj, pug mill mixing

Vitrification

Vitrification	\$27.0	per ton (250 glass ton per day melter unit)				Unit Cost Study- Minergy
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Dewatering - Upland Pond (2 cells)

Land Lease or Purchase	\$1.80	per sf				Ole
Area	608,771	sf	13.97546543			2 days slurry + 13 wk solids * 2 cell
Perimeter	3,121	lf				assume square
Depth of Material in Dewatering Cell	8	feet				based on size at Arrowhead Park
Cell Retention Time	24	hours				Not Used
Cell Depth	10	feet				
Mobilization	\$20,000	LS				pj
Clear and Grub	\$2,000	per acre				pj
Berm Volume	10.4	cy per lf				2:1 slope, 8-foot top
Berm Construction	\$6	per cy				pj
Rough Grading	\$0.25	per sf				pj
Asphalt Liner	\$1.50	per sf				pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS				pj
Regrade Berm Soils	\$6	per cy				pj
Seed/Sod	\$1	per sy				Baird

Dewatering - Mechanical

Mobilization	\$100,000					pj
Holding Pond-Centrifuge	\$80	per bone dry ton				Global Dewatering

Water Treatment

Flow Rate	395	gpm				assume operate 24/7
Unit, Purchase	\$691,235	LS				pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons				
Water Treatment QA	\$200	per day				
Flow Rate (mechanical dewatering)	484	gpm				pj
Unit, Purchase (mechanical dewatering)	\$780,778	LS				pj, 1 sample/day

Disposal

Off-Site Disposal

Load Soil for Hauling	\$2.80	per ton		pj
Round-trip Hauling	2	hours		pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours		pj
Tipping Fee (non-TSCA)	\$43	per ton		St. Paul
Tipping Fee (TSCA)	\$55	per ton		St. Paul
Truck Rate	\$75	per hour		pj
Truck Load	32	tons		pj

Institutional Controls

Public Education Program	\$100,000			pj
O&M Plans	\$20,000			pj
Deed Restrictions	\$5,000			pj
<u>Annual Costs</u>				
Public Education Program	\$30,000			pj
Maintaining O&M Plans	\$800			pj
Reporting	\$20,000			pj
Long-term Monitoring	\$600,000			Anne LTM
Long-term Monitoring (no action)	\$300,000			Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C: Dredge Sediment With Off-site Disposal**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	5	Each	\$500,000
Mobilization - Equipment and Silt Curtain	5	LS	\$850,000
Debris Sweep	73	ac	\$1,168,000
Dredging - 12 hour shifts	77	Day	\$438,900
Dredge Monitoring (Water Quality)	77	Day	\$231,000
Sediment Removal QA	77	Day	\$92,400
Site Restoration	5	Each	\$3,000,000
Direct Capital:			\$6,280,300
Engineering, Procurement & Construction Management:			753,636
Contractor Overhead/Profit:			942,045
Total Capital:			\$8,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	608,771	sf	\$1,095,788
Mobilization	1	LS	\$20,000
Clear and Grub	608,771	sf	\$27,951
Berm Construction	32,365	cy	\$194,193
Rough Grading	608,771	sf	\$152,193
Liner Placement	608,771	sf	\$913,157
Demob/Disposal	1	LS	\$10,000
Regrade	32,365	cy	\$194,193
Seed/Sod	67,641	sy	\$67,641
Direct Capital:			\$2,675,115
Engineering, Procurement & Construction Management:			321,014
Total Capital:			\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,235
Water Treatment (Includes Operator)	61,139,879	gal	\$24,456
Water Treatment QA	108	day	\$21,600
Direct Capital:			\$737,291
Engineering, Procurement & Construction Management:			88,475
Total Capital:			\$800,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	95,673	ton	\$2,391,825
Lime Purchase	9,568	ton	\$574,080
Soil Loading	95,673	ton	\$267,884
Soil Hauling	95,673	ton	\$448,467
Tipping Fees (non-TSCA)	95,673	ton	\$4,113,939
Direct Capital:			\$7,796,196
Engineering, Procurement & Construction Management:			935,543
Total Capital:			\$8,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$25,000,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	5	Each	\$500,000
Mobilization - Equipment and Silt Curtain	5	LS	\$850,000
Debris Sweep	73	ac	\$1,168,000
Dredging - 12 hour shifts	77	Day	\$438,900
Dredge Monitoring (Water Quality)	77	Day	\$231,000
Sediment Removal QA	77	Day	\$92,400
Site Restoration	5	Each	\$3,000,000
Direct Capital:			\$6,280,300
Engineering, Procurement & Construction Management:			753,636
Contractor Overhead/Profit:			942,045
Total Capital:			\$8,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	608,771	sf	\$1,095,788
Mobilization	1	LS	\$20,000
Clear and Grub	608,771	sf	\$27,951
Berm Construction	32,365	cy	\$194,193
Rough Grading	608,771	sf	\$152,193
Liner Placement	608,771	sf	\$913,157
Demob/Disposal	1	LS	\$10,000
Regrade	32,365	cy	\$194,193
Seed/Sod	67,641	sy	\$67,641
Direct Capital:			\$2,675,115
Engineering, Procurement & Construction Management:			321,014
Total Capital:			\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,235
Water Treatment (Includes Operator)	61,139,879	gal	\$24,456
Water Treatment QA	108	day	\$21,600
Direct Capital:			\$737,291
Engineering, Procurement & Construction Management:			88,475
Total Capital:			\$800,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units	Cost
Sediment Treatment	95,673	ton	\$2,583,165
Soil Loading	95,673	ton	\$267,884
Soil Hauling	95,673	ton	\$112,117
Direct Capital:			\$2,963,165
Engineering, Procurement & Construction Management:			\$444,475
Total Capital:			\$3,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$19,700,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
APPLETON TO LITTLE RAPIDS
Action Level - 500 ppb

Material Handling Assumptions:

Volume > 500 ppb	56,998	cy	48	ac	43,510	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	182,450	cy			139,275	m3	
Volume > 250 ppb	80,611	cy			61,535	m3	
Volume > 1,000 ppb	46,178	cy			35,250	m3	
Volume > 5000 ppb	20,148	cy			15,380	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.4						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.7%	v/v	0.98	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density	20%	w/w	9.4%	v/v	0.95	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	29.4%	v/v	1.19	tons per cy	Foth & VanDyke
Treated Density	93.5%	w/w	60.0%	v/v	1.30	tons per cy	
HTTD Treatment Capacity	1,264,377	cy		in situ	1,650,000	tons	
Vitrification Treatment Capacity	1,328,888	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%			
Sales Tax	5.5%			
Engineering, Procurement and Construction Mgmt	12.0%			Not Used
Contractor Overhead and Profit - Dredging Only	15.0%			

Dredging

Debris Sweep	\$16,000	per acre		Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day		
Sediment Removal QA	\$1,200	per day		

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site		pj
Mobilization - Equipment	\$135,000	per dredge		Ogden Beeman
Mobilization - Silt Curtain	\$35,000			Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift		Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift		Ogden Beeman
Site Restoration	\$600,000	per dredge launch site		pj

High Temperature Thermal Desorption

Setup Staging Area	\$50,000			pj
Mobilization/Site Prep	\$150,000			Maxymillian
Sediment Treatment QA	\$2	per ton		
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1		
Sand Purchase and Deliver	\$6	per ton		Ole
Blending	\$25	per ton		Ole
HTTD (includes off-gas treatment)	\$75	per ton		Maxymillian
Stack Testing	\$50,000	LS		Maxymillian
Place Treated Material	\$3	per ton		

Solidification

Percent Lime	10.0%	(w/w)		Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton pj, pug mill mixing

Vitrification

Vitrification	\$27.0	per ton (250 glass ton per day melter unit)		Unit Cost Study- Minergy
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Dewatering - Upland Pond (2 cells)

Land Lease or Purchase	\$1.80	per sf		Ole
Area	608,771	sf	13.97546543	2 days slurry + 13 wk solids * 2 cell
Perimeter	3,121	lf		assume square
Depth of Material in Dewatering Cell	8	feet		based on size at Arrowhead Park
Cell Retention Time	24	hours		Not Used
Cell Depth	10	feet		
Mobilization	\$20,000	LS		pj
Clear and Grub	\$2,000	per acre		pj
Berm Volume	10.4	cy per lf		2:1 slope, 8-foot top
Berm Construction	\$6	per cy		pj
Rough Grading	\$0.25	per sf		pj
Asphalt Liner	\$1.50	per sf		pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS		pj
Regrade Berm Soils	\$6	per cy		pj
Seed/Sod	\$1	per sy		Baird

Dewatering - Mechanical

Mobilization	\$100,000			pj
Holding Pond-Centrifuge	\$80	per bone dry ton		Global Dewatering

Water Treatment

Flow Rate	395	gpm		assume operate 24/7
Unit, Purchase	\$691,235	LS		pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons		
Water Treatment QA	\$200	per day		
Flow Rate (mechanical dewatering)	484	gpm		pj
Unit, Purchase (mechanical dewatering)	\$780,778	LS		pj, 1 sample/day

Disposal

Off-Site Disposal

Load Soil for Hauling	\$2.80	per ton	pj
Round-trip Hauling	2	hours	pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours	pj
Tipping Fee (non-TSCA)	\$43	per ton	St. Paul
Tipping Fee (TSCA)	\$55	per ton	St. Paul
Truck Rate	\$75	per hour	pj
Truck Load	32	tons	pj

Institutional Controls

Public Education Program	\$100,000		pj
O&M Plans	\$20,000		pj
Deed Restrictions	\$5,000		pj
<u>Annual Costs</u>			
Public Education Program	\$30,000		pj
Maintaining O&M Plans	\$800		pj
Reporting	\$20,000		pj
Long-term Monitoring	\$600,000		Anne LTM
Long-term Monitoring (no action)	\$300,000		Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C: Dredge Sediment With Off-site Disposal**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	5	Each	\$500,000
Mobilization - Equipment and Silt Curtain	5	LS	\$850,000
Debris Sweep	48	ac	\$768,000
Dredging - 12 hour shifts	55	Day	\$313,500
Dredge Monitoring (Water Quality)	55	Day	\$165,000
Sediment Removal QA	55	Day	\$66,000
Site Restoration	5	Each	\$3,000,000
Direct Capital:			\$5,662,500
Engineering, Procurement & Construction Management:			679,500
Contractor Overhead/Profit:			849,375
Total Capital:			\$7,200,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	608,771	sf	\$1,095,788
Mobilization	1	LS	\$20,000
Clear and Grub	608,771	sf	\$27,951
Berm Construction	32,365	cy	\$194,193
Rough Grading	608,771	sf	\$152,193
Liner Placement	608,771	sf	\$913,157
Demob/Disposal	1	LS	\$10,000
Regrade	32,365	cy	\$194,193
Seed/Sod	67,641	sy	\$67,641
Direct Capital:			\$2,675,115
Engineering, Procurement & Construction Management:			321,014
Total Capital:			\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,235
Water Treatment (Includes Operator)	43,230,619	gal	\$17,292
Water Treatment QA	76	day	\$15,200
Direct Capital:			\$723,728
Engineering, Procurement & Construction Management:			86,847
Total Capital:			\$800,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	67,649	ton	\$1,691,225
Lime Purchase	6,765	ton	\$405,900
Soil Loading	67,649	ton	\$189,417
Soil Hauling	67,649	ton	\$317,105
Tipping Fees (non-TSCA)	67,649	ton	\$2,908,907
Direct Capital:			\$5,512,554
Engineering, Procurement & Construction Management:			661,506
Total Capital:			\$6,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$21,700,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units		Cost
Site Preparation	5	Each		\$500,000
Mobilization - Equipment and Silt Curtain	5	LS		\$850,000
Debris Sweep	48	ac		\$768,000
Dredging - 12 hour shifts	55	Day	0.423076923	\$313,500
Dredge Monitoring (Water Quality)	55	Day		\$165,000
Sediment Removal QA	55	Day		\$66,000
Site Restoration	5	Each		\$3,000,000
Direct Capital:				\$5,662,500
Engineering, Procurement & Construction Management:				679,500
Contractor Overhead/Profit:				849,375
Total Capital:				\$7,200,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units		Cost
Land Lease or Purchase	608,771	sf		\$1,095,788
Mobilization	1	LS		\$20,000
Clear and Grub	608,771	sf		\$27,951
Berm Construction	32,365	cy		\$194,193
Rough Grading	608,771	sf		\$152,193
Liner Placement	608,771	sf		\$913,157
Demob/Disposal	1	LS		\$10,000
Regrade	32,365	cy		\$194,193
Seed/Sod	67,641	sy		\$67,641
Direct Capital:				\$2,675,115
Engineering, Procurement & Construction Management:				321,014
Total Capital:				\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	395	gpm		\$691,235
Water Treatment (Includes Operator)	43,230,619	gal		\$17,292
Water Treatment QA	76	day		\$15,200
Direct Capital:				\$723,728
Engineering, Procurement & Construction Management:				86,847
Total Capital:				\$800,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units		Cost
Sediment Treatment	67,648	ton		\$1,826,497
Soil Loading	67,648	ton		\$189,415
Soil Hauling	67,648	ton		\$79,275
Direct Capital:				\$2,095,187
Engineering, Procurement & Construction Management:				\$314,278
Total Capital:				\$2,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units		Cost
Deed Restrictions	1	LS		\$5,000
Direct Capital:				\$5,000
Engineering, Procurement & Construction Management:				600
Total Capital:				\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$17,900,000

**BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
APPLETON TO LITTLE RAPIDS
Action Level - 1,000 ppb**

Material Handling Assumptions:

Volume > 1000 ppb	46,178	cy	34	ac	35,250	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	182,450	cy			139,275	m3	
Volume > 250 ppb	80,611	cy			61,535	m3	
Volume > 500 ppb	56,998	cy			43,510	m3	
Volume > 5000 ppb	20,148	cy			15,380	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.4						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.7%	v/v	0.98	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density	20%	w/w	9.4%	v/v	0.95	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	29.4%	v/v	1.19	tons per cy	Foth & VanDyke
Treated Density	93.5%	w/w	60.0%	v/v	1.30	tons per cy	
HTTD Treatment Capacity	1,264,377	cy		in situ	1,650,000	tons	
Vitrification Treatment Capacity	1,328,888	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%		
Sales Tax	5.5%		
Engineering, Procurement and Construction Mgmt	12.0%		Not Used
Contractor Overhead and Profit - Dredging Only	15.0%		

Dredging

Debris Sweep	\$16,000	per acre	Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day	
Sediment Removal QA	\$1,200	per day	

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site	pj
Mobilization - Equipment	\$135,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000		Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift	Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift	Ogden Beeman
Site Restoration	\$600,000	per dredge launch site	pj

High Temperature Thermal Desorption

Setup Staging Area	\$50,000		pj
Mobilization/Site Prep	\$150,000		Maxymillian
Sediment Treatment QA	\$2	per ton	
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1	
Sand Purchase and Deliver	\$6	per ton	Ole
Blending	\$25	per ton	Ole
HTTD (includes off-gas treatment)	\$75	per ton	Maxymillian
Stack Testing	\$50,000	LS	Maxymillian
Place Treated Material	\$3	per ton	

Solidification

Percent Lime	10.0%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25	per ton pj, pug mill mixing

Vitrification

Vitrification	\$27.0	per ton (250 glass ton per day melter unit)	Unit Cost Study- Minergy
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Dewatering - Upland Pond (2 cells)

Land Lease or Purchase	\$1.80	per sf		Ole
Area	608,771	sf	13.97546543	2 days slurry + 13 wk solids * 2 cell
Perimeter	3,121	lf		assume square
Depth of Material in Dewatering Cell	8	feet		based on size at Arrowhead Park
Cell Retention Time	24	hours		Not Used
Cell Depth	10	feet		
Mobilization	\$20,000	LS		pj
Clear and Grub	\$2,000	per acre		pj
Berm Volume	10.4	cy per lf		2:1 slope, 8-foot top
Berm Construction	\$6	per cy		pj
Rough Grading	\$0.25	per sf		pj
Asphalt Liner	\$1.50	per sf		pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS		pj
Regrade Berm Soils	\$6	per cy		pj
Seed/Sod	\$1	per sy		Baird

Dewatering - Mechanical

Mobilization	\$100,000		pj
Holding Pond-Centrifuge	\$80	per bone dry ton	Global Dewatering

Water Treatment

Flow Rate	395	gpm		assume operate 24/7
Unit, Purchase	\$691,235	LS		pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons		
Water Treatment QA	\$200	per day		
Flow Rate (mechanical dewatering)	484	gpm		pj
Unit, Purchase (mechanical dewatering)	\$780,778	LS		pj, 1 sample/day

Disposal

Off-Site Disposal

Load Soil for Hauling	\$2.80	per ton		pj
Round-trip Hauling	2	hours		pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours		pj
Tipping Fee (non-TSCA)	\$43	per ton		St. Paul
Tipping Fee (TSCA)	\$55	per ton		St. Paul
Truck Rate	\$75	per hour		pj
Truck Load	32	tons		pj

Institutional Controls

Public Education Program	\$100,000			pj
O&M Plans	\$20,000			pj
Deed Restrictions	\$5,000			pj
<u>Annual Costs</u>				
Public Education Program	\$30,000			pj
Maintaining O&M Plans	\$800			pj
Reporting	\$20,000			pj
Long-term Monitoring	\$600,000			Anne LTM
Long-term Monitoring (no action)	\$300,000			Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C: Dredge Sediment With Off-site Disposal**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	5	Each	\$500,000
Mobilization - Equipment and Silt Curtain	5	LS	\$850,000
Debris Sweep	34	ac	\$544,000
Dredging - 12 hour shifts	44	Day	\$250,800
Dredge Monitoring (Water Quality)	44	Day	\$132,000
Sediment Removal QA	44	Day	\$52,800
Site Restoration	5	Each	\$3,000,000
Direct Capital:			\$5,329,600
Engineering, Procurement & Construction Management:			639,552
Contractor Overhead/Profit:			799,440
Total Capital:			\$6,800,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	608,771	sf	\$1,095,788
Mobilization	1	LS	\$20,000
Clear and Grub	608,771	sf	\$27,951
Berm Construction	32,365	cy	\$194,193
Rough Grading	608,771	sf	\$152,193
Liner Placement	608,771	sf	\$913,157
Demob/Disposal	1	LS	\$10,000
Regrade	32,365	cy	\$194,193
Seed/Sod	67,641	sy	\$67,641
Direct Capital:			\$2,675,115
Engineering, Procurement & Construction Management:			321,014
Total Capital:			\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,235
Water Treatment (Includes Operator)	35,023,657	gal	\$14,009
Water Treatment QA	62	day	\$12,400
Direct Capital:			\$717,645
Engineering, Procurement & Construction Management:			86,117
Total Capital:			\$800,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	54,806	ton	\$1,370,150
Lime Purchase	5,481	ton	\$328,860
Soil Loading	54,806	ton	\$153,457
Soil Hauling	54,806	ton	\$256,903
Tipping Fees (non-TSCA)	54,806	ton	\$2,356,658
Direct Capital:			\$4,466,028
Engineering, Procurement & Construction Management:			535,923
Total Capital:			\$5,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$20,100,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units		Cost
Site Preparation	5	Each		\$500,000
Mobilization - Equipment and Silt Curtain	5	LS		\$850,000
Debris Sweep	34	ac		\$544,000
Dredging - 12 hour shifts	44	Day	0.338461538	\$250,800
Dredge Monitoring (Water Quality)	44	Day		\$132,000
Sediment Removal QA	44	Day		\$52,800
Site Restoration	5	Each		\$3,000,000
Direct Capital:				\$5,329,600
Engineering, Procurement & Construction Management:				639,552
Contractor Overhead/Profit:				799,440
Total Capital:				\$6,800,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units		Cost
Land Lease or Purchase	608,771	sf		\$1,095,788
Mobilization	1	LS		\$20,000
Clear and Grub	608,771	sf		\$27,951
Berm Construction	32,365	cy		\$194,193
Rough Grading	608,771	sf		\$152,193
Liner Placement	608,771	sf		\$913,157
Demob/Disposal	1	LS		\$10,000
Regrade	32,365	cy		\$194,193
Seed/Sod	67,641	sy		\$67,641
Direct Capital:				\$2,675,115
Engineering, Procurement & Construction Management:				321,014
Total Capital:				\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	395	gpm		\$691,235
Water Treatment (Includes Operator)	35,023,657	gal		\$14,009
Water Treatment QA	62	day		\$12,400
Direct Capital:				\$717,645
Engineering, Procurement & Construction Management:				86,117
Total Capital:				\$800,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units		Cost
Sediment Treatment	54,806	ton		\$1,479,752
Soil Loading	54,806	ton		\$153,456
Soil Hauling	54,806	ton		\$64,225
Direct Capital:				\$1,697,433
Engineering, Procurement & Construction Management:				\$254,615
Total Capital:				\$2,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units		Cost
Deed Restrictions	1	LS		\$5,000
Direct Capital:				\$5,000
Engineering, Procurement & Construction Management:				600
Total Capital:				\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$17,100,000

**BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
APPLETON TO LITTLE RAPIDS
Action Level - 5,000 ppb**

Material Handling Assumptions:

Volume > 5000 ppb	20,148	cy	13	ac	15,380	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	182,450	cy			139,275	m3	
Volume > 250 ppb	80,611	cy			61,535	m3	
Volume > 500 ppb	56,998	cy			43,510	m3	
Volume > 1000 ppb	46,178	cy			35,250	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.4						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	24.2%	w/w	11.7%	v/v	0.98	tons per cy	
Slurry Density (20% in situ)	5.5%	w/w	2.3%	v/v	0.87	tons per cy	Ogden Beeman
Dewatered Density	20%	w/w	9.4%	v/v	0.95	tons per cy	Montgomery Watson
Dewatered Density (mechanical and CDF)	50%	w/w	29.4%	v/v	1.19	tons per cy	Foth & VanDyke
Treated Density	93.5%	w/w	60.0%	v/v	1.30	tons per cy	
HTTD Treatment Capacity	1,264,377	cy		in situ	1,650,000	tons	
Vitrification Treatment Capacity	1,328,888	cy		in situ	2145500.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%			
Sales Tax	5.5%			
Engineering, Procurement and Construction Mgmt	12.0%			Not Used
Contractor Overhead and Profit - Dredging Only	15.0%			

Dredging

Debris Sweep	\$16,000	per acre		Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day		
Sediment Removal QA	\$1,200	per day		

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site		pj
Mobilization - Equipment	\$135,000	per dredge		Ogden Beeman
Mobilization - Silt Curtain	\$35,000			Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift		Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift		Ogden Beeman
Site Restoration	\$600,000	per dredge launch site		pj

High Temperature Thermal Desorption

Setup Staging Area	\$50,000			pj
Mobilization/Site Prep	\$150,000			Maxymillian
Sediment Treatment QA	\$2	per ton		
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1		
Sand Purchase and Deliver	\$6	per ton		Ole
Blending	\$25	per ton		Ole
HTTD (includes off-gas treatment)	\$75	per ton		Maxymillian
Stack Testing	\$50,000	LS		Maxymillian
Place Treated Material	\$3	per ton		

Solidification

Percent Lime	10.0%	(w/w)		Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton pj, pug mill mixing

Vitrification

Vitrification	\$27.0	per ton (250 glass ton per day melter unit)		Unit Cost Study- Minergy
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Dewatering - Upland Pond (2 cells)

Land Lease or Purchase	\$1.80	per sf		Ole
Area	608,771	sf	13.97546543	2 days slurry + 13 wk solids * 2 cell
Perimeter	3,121	lf		assume square
Depth of Material in Dewatering Cell	8	feet		based on size at Arrowhead Park
Cell Retention Time	24	hours		Not Used
Cell Depth	10	feet		
Mobilization	\$20,000	LS		pj
Clear and Grub	\$2,000	per acre		pj
Berm Volume	10.4	cy per lf		2:1 slope, 8-foot top
Berm Construction	\$6	per cy		pj
Rough Grading	\$0.25	per sf		pj
Asphalt Liner	\$1.50	per sf		pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS		pj
Regrade Berm Soils	\$6	per cy		pj
Seed/Sod	\$1	per sy		Baird

Dewatering - Mechanical

Mobilization	\$100,000			pj
Holding Pond-Centrifuge	\$80	per bone dry ton		Global Dewatering

Water Treatment

Flow Rate	395	gpm		assume operate 24/7
Unit, Purchase	\$691,235	LS		pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons		
Water Treatment QA	\$200	per day		
Flow Rate (mechanical dewatering)	484	gpm		pj
Unit, Purchase (mechanical dewatering)	\$780,778	LS		pj, 1 sample/day

Disposal

Off-Site Disposal

Load Soil for Hauling	\$2.80	per ton		pj
Round-trip Hauling	2	hours		pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours		pj
Tipping Fee (non-TSCA)	\$43	per ton		St. Paul
Tipping Fee (TSCA)	\$55	per ton		St. Paul
Truck Rate	\$75	per hour		pj
Truck Load	32	tons		pj

Institutional Controls

Public Education Program	\$100,000			pj
O&M Plans	\$20,000			pj
Deed Restrictions	\$5,000			pj
<u>Annual Costs</u>				
Public Education Program	\$30,000			pj
Maintaining O&M Plans	\$800			pj
Reporting	\$20,000			pj
Long-term Monitoring	\$600,000			Anne LTM
Long-term Monitoring (no action)	\$300,000			Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C: Dredge Sediment With Off-site Disposal**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	5	Each	\$500,000
Mobilization - Equipment and Silt Curtain	5	LS	\$850,000
Debris Sweep	13	ac	\$208,000
Dredging - 12 hour shifts	20	Day	\$114,000
Dredge Monitoring (Water Quality)	20	Day	\$60,000
Sediment Removal QA	20	Day	\$24,000
Site Restoration	5	Each	\$3,000,000
Direct Capital:			\$4,756,000
Engineering, Procurement & Construction Management:			570,720
Contractor Overhead/Profit:			713,400
Total Capital:			\$6,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	608,771	sf	\$1,095,788
Mobilization	1	LS	\$20,000
Clear and Grub	608,771	sf	\$27,951
Berm Construction	32,365	cy	\$194,193
Rough Grading	608,771	sf	\$152,193
Liner Placement	608,771	sf	\$913,157
Demob/Disposal	1	LS	\$10,000
Regrade	32,365	cy	\$194,193
Seed/Sod	67,641	sy	\$67,641
Direct Capital:			\$2,675,115
Engineering, Procurement & Construction Management:			321,014
Total Capital:			\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,235
Water Treatment (Includes Operator)	15,281,244	gal	\$6,112
Water Treatment QA	27	day	\$5,400
Direct Capital:			\$702,748
Engineering, Procurement & Construction Management:			84,330
Total Capital:			\$800,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	23,913	ton	\$597,825
Lime Purchase	2,392	ton	\$143,520
Soil Loading	23,913	ton	\$66,956
Soil Hauling	23,913	ton	\$112,092
Tipping Fees (non-TSCA)	23,913	ton	\$1,028,259
Direct Capital:			\$1,948,653
Engineering, Procurement & Construction Management:			233,838
Total Capital:			\$2,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$16,500,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	5	Each	\$500,000
Mobilization - Equipment and Silt Curtain	5	LS	\$850,000
Debris Sweep	13	ac	\$208,000
Dredging - 12 hour shifts	20	Day	\$114,000
Dredge Monitoring (Water Quality)	20	Day	\$60,000
Sediment Removal QA	20	Day	\$24,000
Site Restoration	5	Each	\$3,000,000
Direct Capital:			\$4,756,000
Engineering, Procurement & Construction Management:			\$70,720
Contractor Overhead/Profit:			713,400
Total Capital:			\$6,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	608,771	sf	\$1,095,788
Mobilization	1	LS	\$20,000
Clear and Grub	608,771	sf	\$27,951
Berm Construction	32,365	cy	\$194,193
Rough Grading	608,771	sf	\$152,193
Liner Placement	608,771	sf	\$913,157
Demob/Disposal	1	LS	\$10,000
Regrade	32,365	cy	\$194,193
Seed/Sod	67,641	sy	\$67,641
Direct Capital:			\$2,675,115
Engineering, Procurement & Construction Management:			321,014
Total Capital:			\$3,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	395	gpm	\$691,235
Water Treatment (Includes Operator)	15,281,244	gal	\$6,112
Water Treatment QA	27	day	\$5,400
Direct Capital:			\$702,748
Engineering, Procurement & Construction Management:			84,330
Total Capital:			\$800,000

SEDIMENT TREATMENT (VITRIFICATION 1x250 tons Integrated Storage Unit)

Capital Items	Quantity	Units	Cost
Sediment Treatment	23,912	ton	\$645,634
Soil Loading	23,912	ton	\$66,955
Soil Hauling	23,912	ton	\$28,022
Direct Capital:			\$740,611
Engineering, Procurement & Construction Management:			\$111,092
Total Capital:			\$900,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$15,200,000

Table 7-8 Cost Summary for Remedial Alternatives - Little Rapids to De Pere**125 ppb**

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	1,483,156	\$33,900,000	---	---	\$3,100,000	\$1,700,000	---	---	\$181,000,000	\$4,500,000	\$224,200,000	\$44,840,000	\$269,040,000
C2A	1,483,156	\$43,300,000	---	---	---	\$5,100,000	---	---	\$19,400,000	\$4,500,000	\$72,300,000	\$14,460,000	\$86,760,000
C2B	1,483,156	\$43,300,000	---	---	\$22,100,000	\$5,000,000	---	---	\$104,900,000	\$4,500,000	\$179,800,000	\$35,960,000	\$215,760,000
C3	1,483,156	\$33,900,000	---	---	\$53,400,000	\$2,600,000	---	---	\$67,300,000	\$4,500,000	\$161,700,000	\$32,340,000	\$194,040,000
D	1,483,156	\$33,900,000	---	---	---	\$1,900,000	---	\$32,000,000	---	\$4,500,000	\$72,300,000	\$14,460,000	\$86,760,000
E	1,483,156	\$43,300,000	---	---	\$22,100,000	\$10,700,000	\$62,100,000	---	---	\$4,500,000	\$142,700,000	\$28,540,000	\$171,240,000
F	585,020	\$23,100,000	---	\$40,500,000	\$3,100,000	\$1,100,000	---	---	\$71,400,000	\$4,500,000	\$143,700,000	\$28,740,000	\$172,440,000

250 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	1,171,585	\$28,600,000	---	---	\$3,100,000	\$1,500,000	---	---	\$143,000,000	\$4,500,000	\$180,700,000	\$36,140,000	\$216,840,000
C2A	1,171,585	\$37,600,000	---	---	---	\$4,900,000	---	---	\$16,200,000	\$4,500,000	\$63,200,000	\$12,640,000	\$75,840,000
C2B	1,171,585	\$37,600,000	---	---	\$22,100,000	\$4,900,000	---	---	\$83,700,000	\$4,500,000	\$152,800,000	\$30,560,000	\$183,360,000
C3	1,171,585	\$28,600,000	---	---	\$42,200,000	\$2,400,000	---	---	\$53,100,000	\$4,500,000	\$130,800,000	\$26,160,000	\$156,960,000
D	1,171,585	\$28,600,000	---	---	---	\$1,700,000	---	\$32,000,000	---	\$4,500,000	\$66,800,000	\$13,360,000	\$80,160,000
E	1,171,585	\$37,600,000	---	---	\$22,100,000	\$10,500,000	\$49,100,000	---	---	\$4,500,000	\$123,800,000	\$24,760,000	\$148,560,000
F	411,065	\$19,500,000	---	\$36,000,000	\$3,100,000	\$1,000,000	---	---	\$50,200,000	\$4,500,000	\$114,300,000	\$22,860,000	\$137,160,000

500 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	776,791	\$20,500,000	---	---	\$3,100,000	\$1,300,000	---	---	\$94,800,000	\$4,500,000	\$124,200,000	\$24,840,000	\$149,040,000
C2A	776,791	\$30,100,000	---	---	---	\$4,700,000	---	---	\$12,100,000	\$4,500,000	\$51,400,000	\$10,280,000	\$61,680,000
C2B	776,791	\$30,100,000	---	---	\$22,100,000	\$4,700,000	---	---	\$56,900,000	\$4,500,000	\$118,300,000	\$23,660,000	\$141,960,000
C3	776,791	\$20,500,000	---	---	\$28,000,000	\$2,100,000	---	---	\$35,200,000	\$4,500,000	\$90,300,000	\$18,060,000	\$108,360,000
D	776,791	\$20,500,000	---	---	---	\$1,400,000	---	\$32,000,000	---	\$4,500,000	\$58,400,000	\$11,680,000	\$70,080,000
E	776,791	\$30,100,000	---	---	\$22,100,000	\$10,300,000	\$32,500,000	---	---	\$4,500,000	\$99,500,000	\$19,900,000	\$119,400,000
F	283,812	\$14,600,000	---	\$30,100,000	\$3,100,000	\$900,000	---	---	\$34,600,000	\$4,500,000	\$87,800,000	\$17,560,000	\$105,360,000

1000 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	586,788	\$14,800,000	---	---	\$3,100,000	\$1,100,000	---	---	\$71,600,000	\$4,500,000	\$95,100,000	\$19,020,000	\$114,120,000
C2A	586,788	\$24,700,000	---	---	---	\$4,600,000	---	---	\$10,100,000	\$4,500,000	\$43,900,000	\$8,780,000	\$52,680,000
C2B	586,788	\$24,700,000	---	---	\$22,100,000	\$4,600,000	---	---	\$44,000,000	\$4,500,000	\$99,900,000	\$19,980,000	\$119,880,000
C3	586,788	\$14,800,000	---	---	\$21,200,000	\$2,000,000	---	---	\$26,600,000	\$4,500,000	\$69,100,000	\$13,820,000	\$82,920,000
D	586,788	\$14,800,000	---	---	---	\$1,200,000	---	\$32,000,000	---	\$4,500,000	\$52,500,000	\$10,500,000	\$63,000,000
E	586,788	\$24,700,000	---	---	\$22,100,000	\$10,300,000	\$24,600,000	---	---	\$4,500,000	\$86,200,000	\$17,240,000	\$103,440,000
F	170,418	\$9,800,000	---	\$23,800,000	\$3,100,000	\$900,000	---	---	\$20,800,000	\$4,500,000	\$62,900,000	\$12,580,000	\$75,480,000

5000 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C1	186,348	\$6,900,000	---	---	\$3,100,000	\$900,000	---	---	\$22,700,000	\$4,500,000	\$38,100,000	\$7,620,000	\$45,720,000
C2A	186,348	\$17,400,000	---	---	---	\$4,500,000	---	---	\$6,000,000	\$4,500,000	\$32,400,000	\$6,480,000	\$38,880,000
C2B	186,348	\$17,400,000	---	---	\$22,100,000	\$4,500,000	---	---	\$16,800,000	\$4,500,000	\$65,300,000	\$13,060,000	\$78,360,000
C3	186,348	\$6,900,000	---	---	\$6,800,000	\$1,700,000	---	---	\$8,500,000	\$4,500,000	\$28,400,000	\$5,680,000	\$34,080,000
D	186,348	\$6,900,000	---	---	---	\$1,000,000	---	\$32,000,000	---	\$4,500,000	\$44,400,000	\$8,880,000	\$53,280,000
E	186,348	\$17,400,000	---	---	\$22,100,000	\$10,100,000	\$7,800,000	---	---	\$4,500,000	\$61,900,000	\$12,380,000	\$74,280,000
F	50,160	\$5,200,000	---	\$15,000,000	\$3,100,000	\$800,000	---	---	\$6,100,000	\$4,500,000	\$34,700,000	\$6,940,000	\$41,640,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE RAPIDS TO DE PERE
Action Level - 125 ppb

Material Handling Assumptions:

Volume > 125 ppb	1,483,156	cy	739	ac	1,132,180	m3	Acres corresponds to dredge footprint area
Volume > 250 ppb	1,171,585	cy			894,340	m3	
Volume > 500 ppb	776,791	cy			592,970	m3	
Volume > 1,000 ppb	586,788	cy			447,930	m3	
Volume > 5000 ppb	186,348	cy			142,250	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.47						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	37.1%	w/w	19.3%	v/v	1.08	tons per cy	
Slurry Density (20% in situ)	9.0%	w/w	3.9%	v/v	0.89	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	14.8%	v/v	1.03	tons per cy	Montgomery Watson
Dewatered Density (CDF or landfill)	50%	w/w	28.8%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.7%	w/w	60.0%	v/v	1.33	tons per cy	
HTTD Treatment Capacity	2,198,917	cy			1,650,000	tons	
Cap Volume	898,136	cy			685,600	m3	
Vitrification Treatment Capacity	8,028,121	cy	in situ		6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%					
Sales Tax	5.5%					Not Used
Engineering, Procurement and Construction Mgmt	12.0%					
Contractor Overhead and Profit - Dredging Only	15.0%					

Dredging

Debris Sweep	\$16,000	per acre				Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day				
Sediment Removal QA	\$1,200	per day				

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site				pj
Mobilization - Equipment	\$135,000	per dredge				Ogden Beeman
Mobilization - Silt Curtain	\$35,000					Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift				Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift				Ogden Beeman
Site Restoration	\$600,000	per dredge launch site				pj

Hydraulic - 2 12-inch Cutterheads

Site Preparation	\$803,400	LS				Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS				Ogden Beeman
Mobilization - Silt Curtain	\$35,000					Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift				Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift				Ogden Beeman
Winter Over Equipment	\$285,000	per year				Ogden Beeman
Site Restoration	\$600,000	per dredge launch site				
Length of Piping	95,000	ft	18	mi		Distance to Town of Holland (map provided by Fred Swed) 11 mi of hard piping plus 7 mi of floating pipe

Piping Purchase/Installation	\$67	per ft				Ogden Beeman
Number of Road Crossings	4	each				pj, review map
Cost per Road Crossing	\$50,000	per crossing				pj, review map
Number of Booster Pumps	4	each				Ogden Beeman
Booster Pump Cost	\$2,500	per day				Ogden Beeman

High Temperature Thermal Desorption

Setup Staging Area	\$50,000					pj
Mobilization/Site Prep	\$150,000					Maxymillian
Sediment Treatment QA	\$2	per ton				
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1				
Sand Purchase and Deliver	\$6	per ton				Ole
Blending	\$25	per ton				Ole
HTTD (includes off-gas treatment)	\$75	per ton				Maxymillian
Stack Testing	\$50,000	LS				Maxymillian
Place Treated Material	\$3	per ton				

Vitrification

Capital Costs	\$36,000,000	LS				Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year				Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton				Unit Cost Study- Minergy

Capping

Mobilization/Site Prep	\$200,000					Ogden Beeman
Area	11,689,322	sf	1,086,000		m2	
Sand Cap Depth	1.7	feet				
Placement Rate	\$6	per cy				Ogden Beeman
Sand Purchase	\$6	per ton				Ole
Sand Density	1.4	tons per cy				
Armored Cap Depth	1.0	feet				
Cobbles	\$30	per cy				Means
Cap Placement QA	\$100,000	LS				Ogden Beeman
Long-term O&M	2%	of capital				pj
Long-term Monitoring	\$400,000	per year				Anne LTM

Nearshore CDF		Arrowhead		Menasha	
Land Lease or Purchase	\$1.8	per sf		\$1.8	Ole
Length	8,000	lf		9,200	Baird
Capping Volume	190,000	cy		170,000	Baird
Seeding Area	280,000	sy		250,000	Baird
Sheetpile Wall Length	8,000	lf		9,200	Baird
Sheetpile Depth	30	ft		30	based on bathymetry
Sheetpile Cost	\$19	per sf		\$19	pj
Shot Rock Berm	\$650	per lf		\$550	Baird
Rip Rap	\$215	per lf		\$250	Baird
Place Treated Material	\$2	per cy		\$2	pj
Clean Soil Cap	\$10	per cy		\$10	Baird
Seeding	\$1	per sy		\$1	Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10.0%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area (1050 cy dredge rate)	636,049	sf	14.60168334		2 days slurry + 13 wk solids * 2 cell
Perimeter (1050 cy dredge rate)	3,190	lf			assume square
Area (2885 cy dredge rate)	5,010,182	sf	115.0179519		2 days slurry + 13 wk solids * 2 cells * 2 shifts per day
					assume square
Perimeter (2885 cy dredge rate)	8,953	lf			based on size at Arrowhead Park
Depth of Material in Dewatering Cell	8	feet			Not Used
Cell Retention Time	24	hours			
Cell Depth	10	feet			
Mobilization	\$20,000	LS			pj
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Asphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Water Treatment					
Flow Rate (1 10-inch Dredge; settling pond)	389	gpm			assume operate 24/7
Unit, Purchase (1 10-inch Dredge; settling pond)	\$684,675	LS			pj
Flow Rate (1 10-inch Dredge; CDF)	456	gpm			assume operate 24/7
Unit, Purchase (1 10-inch Dredge; CDF)	\$752,984	LS			pj
Flow Rate (2 12-inch Dredges)	3,505	gpm			assume operate 24/7
Unit, Purchase (2 12-inch Dredges)	\$2,561,265	LS			pj
Flow Rate (2-12-in Dredges; settling pond)	2,991	gpm			assume operate 24/7
Flow Rate (mechanical dewatering)	1,252	gpm			
Unit, Purchase (mechanical dewatering)	\$1,380,892	LS			pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj, 1 sample/day
Water Treatment QA	\$200	per day			Distance from town of Holland to river per map provided by Fred Swed
Length of piping for treated water discharge	20,000	feet			
Disposal					
Off-Site Disposal (Existing NR 500 Commercial)					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Conveyer Facility Construction	1,000,000	LS			pj
Dedicated NR 500 Monofill					
Landfill Construction	\$5,611,941				
Landfill Area	140	acres			
Local Siting Fee	\$5	per cy			
Closure Cap	\$100,000	per acre			
Operating Cost	\$500,000	per year			
Post-closure Monitoring	\$30,000	per year			
Institutional Controls					
Public Education Program	\$100,000				pj
O&M Plans	\$20,000				pj
Deed Restrictions	\$5,000				pj
Annual Costs					
Public Education Program	\$30,000				pj
Maintaining O&M Plans	\$800				pj
Reporting	\$20,000				pj
Long-term Monitoring	\$600,000				Anne LTM
Long-term Monitoring (no action)	\$300,000				Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	739	ac	\$11,824,000
Dredging - 12 hour shifts	1413	Day	10.86923077 \$8,054,100
Dredge Monitoring (Water Quality)	1413	Day	\$4,239,000
Sediment Removal QA	1413	Day	\$1,695,600
Site Restoration	1	Each	\$600,000
Direct Capital:			\$26,682,700
Engineering, Procurement & Construction Management:			3,201,924
Contractor Overhead/Profit:			4,002,405
Total Capital:			\$33,900,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	1,107,174,048	gal	\$442,870
Water Treatment QA	1,978	day	\$395,600
Direct Capital:			\$1,523,145
Engineering, Procurement & Construction Management:			182,777
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	1,982,931	ton	\$49,573,275
Lime Purchase	198,294	ton	\$11,897,640
Soil Loading	1,982,931	ton	\$5,552,207
Soil Hauling	1,982,931	ton	\$9,294,989
Tipping Fees (non-TSCA)	1,982,931	ton	\$85,266,033
Direct Capital:			\$161,584,144
Engineering, Procurement & Construction Management:			19,390,097
Total Capital:			\$181,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$224,200,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	739	ac	\$11,824,000
Dredging - 2 12-hour shifts	258	Day	\$7,327,200
Dredge Monitoring (Water Quality)	258	Day	\$1,548,000
Sediment Removal QA	258	Day	\$619,200
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$2,580,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$34,125,200
Engineering, Procurement & Construction Management:			4,095,024
Contractor Overhead/Profit:			5,118,780
Total Capital:			\$43,300,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,505	gpm	\$2,561,265
Water Treatment (Includes Operator)	1,297,331,997	gal	\$518,933
Water Treatment QA	258	day	\$103,200
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$4,523,398
Engineering, Procurement & Construction Management:			542,808
Total Capital:			\$5,100,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Landfill Construction	1	LS	\$5,611,941
Local Siting Fee	992,071	cy	\$4,960,355
Closure	31	acres	\$3,074,600
Direct Capital:			\$13,646,896
Engineering, Procurement & Construction Management:			1,637,628
Total Capital:			\$15,300,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$19,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$72,300,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	739	ac	\$11,824,000
Dredging - 2 12-hour shifts	258	Day	\$7,327,200
Dredge Monitoring (Water Quality)	258	Day	\$1,548,000
Sediment Removal QA	258	Day	\$619,200
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$2,580,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$34,125,200
Engineering, Procurement & Construction Management:			4,095,024
Contractor Overhead/Profit:			5,118,780
Total Capital:			\$43,300,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	5,010,182	sf	\$9,018,328
Mobilization	1	LS	\$20,000
Clear and Grub	5,010,182	sf	\$230,036
Berm Construction	92,850	cy	\$557,099
Rough Grading	5,010,182	sf	\$1,252,545
Liner Placement	5,010,182	sf	\$7,515,273
Demob/Disposal	1	LS	\$10,000
Regrade	92,850	cy	\$557,099
Seed/Sod	556,687	sy	\$556,687
Direct Capital:			\$19,717,067
Engineering, Procurement & Construction Management:			2,366,048
Total Capital:			\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	2,991	gpm	\$2,561,265
Water Treatment (Includes Operator)	1,107,174,048	gal	\$442,870
Water Treatment QA	720	day	\$144,000
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$4,488,135
Engineering, Procurement & Construction Management:			538,576
Total Capital:			\$5,000,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	1,982,931	ton	\$49,573,275
Lime Purchase	198,294	ton	\$11,897,640
Sediment Loading	1,982,930	ton	\$5,552,205
Sediment Hauling	1,982,930	ton	\$9,294,987
Landfill Construction	1	LS	\$5,611,941
Local Siting Fee	992,071	cy	\$4,960,355
Closure	31	acres	\$3,074,600
Direct Capital:			\$89,965,003
Engineering, Procurement & Construction Management:			10,795,800
Total Capital:			\$100,800,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$104,900,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$179,800,000

ALTERNATIVE C3: Dredge with Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	739	ac	\$11,824,000
Dredging - 12 hour shifts	1413	Day	10.86923077 \$8,054,100
Dredge Monitoring (Water Quality)	1413	Day	\$4,239,000
Sediment Removal QA	1413	Day	\$1,695,600
Site Restoration	1	Each	\$600,000
Direct Capital:			\$26,682,700
Engineering, Procurement & Construction Management:			3,201,924
Contractor Overhead/Profit:			4,002,405
Total Capital:			\$33,900,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	594,879	bdt	\$47,590,332
Direct Capital:			\$47,690,332
Engineering, Procurement & Construction Management:			5,722,840
Total Capital:			\$53,400,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	456	gpm	\$1,380,892
Water Treatment (Includes Operator)	1,297,331,997	gal	\$518,933
Water Treatment QA	1,978	day	\$395,600
Direct Capital:			\$2,295,425
Engineering, Procurement & Construction Management:			275,451
Total Capital:			\$2,600,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	1,189,758	ton	\$3,331,323
Soil Hauling	1,189,758	ton	\$5,576,992
Tipping Fees (non-TSCA)	1,189,758	ton	\$51,159,607
Tipping Fees (TSCA)	0	ton	\$0
Direct Capital:			\$60,067,922
Engineering, Procurement & Construction Management:			7,208,151
Total Capital:			\$67,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$161,700,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	739	ac	\$11,824,000
Dredging - 12 hour shifts	1413	Day	10.86923077 \$8,054,100
Dredge Monitoring (Water Quality)	1413	Day	\$4,239,000
Sediment Removal QA	1413	Day	\$1,695,600
Site Restoration	1	Each	\$600,000
Direct Capital:			\$26,682,700
Engineering, Procurement & Construction Management:			3,201,924
Contractor Overhead/Profit:			4,002,405
Total Capital:			\$33,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	456	gpm	\$752,984
Water Treatment (Includes Operator)	1,297,331,997	gal	\$518,933
Water Treatment QA	1,978	day	\$395,600
Direct Capital:			\$1,667,517
Engineering, Procurement & Construction Management:			200,102
Total Capital:			\$1,900,000

CDF CONSTRUCTION - MENASHA

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	27,778	sf	\$50,000
Shot Rock/Rip Rap	9,200	lf	\$7,360,000
Sheetpile Placement	276,000	sf	\$5,244,000
Clean Soil Cap	170,000	cy	\$1,700,000
Seeding	250,000	sy	\$250,000
Mitigation	52	acre	\$516,529
Direct Capital:			\$15,120,529
Engineering, Procurement & Construction Management:			1,814,463
Total Capital:			\$16,934,992

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	338,700	\$5,096,178
Total Present Worth, Longer Term O&M Costs			\$15,026,734
Total Project Capital and O&M Cost			\$32,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$72,300,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (12-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	2	Each	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	739	ac	\$11,824,000
Dredging - 2 12-hour shifts	258	Day	\$7,327,200
Dredge Monitoring (Water Quality)	258	Day	\$1,548,000
Sediment Removal QA	258	Day	\$619,200
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$2,580,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$34,125,200
Engineering, Procurement & Construction Management:			4,095,024
Contractor Overhead/Profit:			5,118,780
Total Capital:			\$43,300,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	5,010,182	sf	\$9,018,328
Mobilization	1	LS	\$20,000
Clear and Grub	5,010,182	sf	\$230,036
Berm Construction	92,850	cy	\$557,099
Rough Grading	5,010,182	sf	\$1,252,545
Liner Placement	5,010,182	sf	\$7,515,273
Demob/Disposal	1	LS	\$10,000
Regrade	92,850	cy	\$557,099
Seed/Sod	556,687	sy	\$556,687
Direct Capital:			\$19,717,067
Engineering, Procurement & Construction Management:			2,366,048
Total Capital:			\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	2,991	gpm	\$2,561,265
Water Treatment (Includes Operator)	1,107,174,048	gal	\$442,870
Water Treatment QA	720	day	\$144,000
Piping	95,000	ft	\$6,365,000
Direct Capital:			\$9,513,135
Engineering, Procurement & Construction Management:			1,141,576
Total Capital:			\$10,700,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units	Cost
Sediment Treatment	1,982,930	ton	\$47,590,332
Soil Loading	1,982,930	ton	\$5,552,205
Soil Hauling	1,982,930	ton	\$2,323,747
Direct Capital:			\$55,466,284
Engineering, Procurement & Construction Management:			\$6,655,954
Total Capital:			\$62,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$142,700,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge and Off-site Disposal

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	1,010,188	tons	\$6,061,130
Sand Placement	721,563	cy	\$4,329,379
Cobble Purchase and Placement	432,938	cy	\$12,988,136
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$23,678,645
Engineering, Procurement & Construction Management:			2,841,437
Total Capital:			\$26,520,082
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$530,402	\$7,980,581
Total Present Worth, Longer Term O&M Costs			\$13,999,099
Total Project Capital and O&M Cost			\$40,500,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	739	ac	\$11,824,000
Dredging - 12 hour shifts	558	Day	\$3,180,600
Dredge Monitoring (Water Quality)	558	Day	\$1,674,000
Sediment Removal QA	558	Day	\$669,600
Site Restoration	1	Each	\$600,000
Direct Capital:			\$18,218,200
Engineering, Procurement & Construction Management:			2,186,184
Contractor Overhead/Profit:			2,732,730
Total Capital:			\$23,100,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	436,716,588	gal	\$174,687
Water Treatment QA	781	Day	\$156,200
Direct Capital:			\$1,015,562
Engineering, Procurement & Construction Management:			121,867
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	782,153	ton	\$19,553,825
Lime Purchase	78,216	ton	\$4,692,960
Soil Loading	782,153	ton	\$2,190,028
Soil Hauling	782,153	ton	\$3,666,342
Tipping Fees (non-TSCA)	782,153	ton	\$33,632,579
Direct Capital:			\$63,735,735
Engineering, Procurement & Construction Management:			7,648,288
Total Capital:			\$71,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$143,700,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE RAPIDS TO DE PERE
Action Level - 250 ppb

Material Handling Assumptions:

Volume > 250 ppb	1,171,585	cy	665	ac	894,340	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	1,483,156	cy			1,132,180	m3	
Volume > 500 ppb	776,791	cy			592,970	m3	
Volume > 1,000 ppb	586,788	cy			447,930	m3	
Volume > 5000 ppb	186,348	cy			142,250	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.47						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	37.1%	w/w	19.3%	v/v	1.08	tons per cy	
Slurry Density (20% in situ)	9.0%	w/w	3.9%	v/v	0.89	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	14.8%	v/v	1.03	tons per cy	Montgomery Watson
Dewatered Density (CDF or landfill)	50%	w/w	28.8%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.7%	w/w	60.0%	v/v	1.33	tons per cy	
HTTD Treatment Capacity	2,198,917	cy			1,650,000	tons	
Cap Volume	760,521	cy			580,550	m3	
Vitrification Treatment Capacity	8,028,121	cy		in situ	6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						
Sales Tax	5.5%						Not Used
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Debris Sweep	\$16,000	per acre					Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site					pj
Mobilization - Equipment	\$135,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift					Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					pj

Hydraulic - 2 12-inch Cutterheads

Site Preparation	\$803,400	LS					Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift					Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift					Ogden Beeman
Winter Over Equipment	\$285,000	per year					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					
Length of Piping	95,000	ft		18	mi		Distance to Town of Holland (map provided by Fred Swed) 11 mi of hard piping plus 7 mi of floating pipe

Piping Purchase/Installation	\$67	per ft					Ogden Beeman
Number of Road Crossings	4	each					pj, review map
Cost per Road Crossing	\$50,000	per crossing					pj, review map
Number of Booster Pumps	4	each					Ogden Beeman
Booster Pump Cost	\$2,500	per day					Ogden Beeman

High Temperature Thermal Desorption

Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					

Vitrification

Capital Costs	\$36,000,000	LS					Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year					Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton					Unit Cost Study- Minergy

Capping

Mobilization/Site Prep	\$200,000						Ogden Beeman
Area	10,155,502	sf	943,500		m2		
Sand Cap Depth	1.7	feet					
Placement Rate	\$6	per cy					Ogden Beeman
Sand Purchase	\$6	per ton					Ole
Sand Density	1.4	tons per cy					
Armored Cap Depth	1.0	feet					
Cobbles	\$30	per cy					Means
Cap Placement QA	\$100,000	LS					Ogden Beeman
Long-term O&M	2%	of capital					pj
Long-term Monitoring	\$400,000	per year					Anne LTM

Nearshore CDF		Arrowhead		Menasha	
Land Lease or Purchase		\$1.8	per sf	\$1.8	Ole
Length		8,000	lf	9,200	Baird
Capping Volume		190,000	cy	170,000	Baird
Seeding Area		280,000	sy	250,000	Baird
Sheetpile Wall Length		8,000	lf	9,200	Baird
Sheetpile Depth		30	ft	30	based on bathymetry
Sheetpile Cost		\$19	per sf	\$19	pj
Shot Rock Berm		\$650	per lf	\$550	Baird
Rip Rap		\$215	per lf	\$250	Baird
Place Treated Material		\$2	per cy	\$2	pj
Clean Soil Cap		\$10	per cy	\$10	Baird
Seeding		\$1	per sy	\$1	Baird
Mitigation		\$10,000	per acre		Tim
		\$10,000	per year		Tim
Long-term Monitoring		\$650,000	per year		Anne LTM
Long-term O&M		2%	of capital		pj
Solidification					
Percent Lime		10.0%	(w/w)		Montgomery Watson
Lime		\$60	per ton	Mixing \$25 per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase		\$1.80	per sf		Ole
Area (1050 cy dredge rate)		636,049	sf		2 days slurry + 13 wk solids * 2 cell
Perimeter (1050 cy dredge rate)		3,190	lf		assume square
Area (2885 cy dredge rate)		5,010,182	sf		2 days slurry + 13 wk solids * 2
					cells * 2 shifts per day
Perimeter (2885 cy dredge rate)		8,953	lf		assume square
Depth of Material in Dewatering Cell		8	feet		based on size at Arrowhead Park
Cell Retention Time		24	hours		Not Used
Cell Depth		10	feet		
Mobilization		\$20,000	LS		pj
Clear and Grub		\$2,000	per acre		pj
Berm Volume		10.4	cy per lf		2:1 slope, 8-foot top
Berm Construction		\$6	per cy		pj
Rough Grading		\$0.25	per sf		pj
Asphalt Liner		\$1.50	per sf		pj, 2 2-inch lifts
Demob/Disposal		\$10,000	LS		pj
Regrade Berm Soils		\$6	per cy		pj
Seed/Sod		\$1	per sy		Baird
Dewatering - Mechanical					
Mobilization		\$100,000			pj
Holding Pond-Centrifuge		\$80	per bone dry ton		Global Dewatering
Water Treatment					
Flow Rate (1 10-inch Dredge; settling pond)		389	gpm		assume operate 24/7
Unit, Purchase (1 10-inch Dredge; settling pond)		\$684,675	LS		pj
Flow Rate (1 10-inch Dredge; CDF)		456	gpm		assume operate 24/7
Unit, Purchase (1 10-inch Dredge; CDF)		\$752,984	LS		pj
Flow Rate (2 12-inch Dredges)		3,505	gpm		assume operate 24/7
Unit, Purchase (2 12-inch Dredges)		\$2,561,265	LS		pj
Flow Rate (2-12-in Dredges; settling pond)		2,991	gpm		assume operate 24/7
Flow Rate (mechanical dewatering)		1,252	gpm		
Unit, Purchase (mechanical dewatering)		\$1,380,892	LS		
Water Treatment (Including Operator)		\$0.40	per 1,000 gallons		pj
Water Treatment QA		\$200	per day		pj, 1 sample/day
Length of piping for treated water discharge		20,000	feet		Distance from town of Holland to river per map provided by Fred Swed
Disposal					
Off-Site Disposal (Existing NR 500 Commercial)					
Load Soil for Hauling		\$2.80	per ton		pj
Round-trip Hauling		2	hours		pj
Round-trip Hauling (to Vittrification Facility)		0.5	hours		pj
Tipping Fee (non-TSCA)		\$43	per ton		St. Paul
Tipping Fee (TSCA)		\$55	per ton		St. Paul
Truck Rate		\$75	per hour		pj
Truck Load		32	tons		pj
Conveyer Facility Construction		1,000,000	LS		pj
Dedicated NR 500 Monofill					
Landfill Construction		\$4,433,026			
Landfill Area		140	acres		
Local Siting Fee		\$5	per cy		
Closure Cap		\$100,000	per acre		
Operating Cost		\$500,000	per year		
Post-closure Monitoring		\$30,000	per year		
Institutional Controls					
Public Education Program		\$100,000			pj
O&M Plans		\$20,000			pj
Deed Restrictions		\$5,000			pj
Annual Costs					
Public Education Program		\$30,000			pj
Maintaining O&M Plans		\$800			pj
Reporting		\$20,000			pj
Long-term Monitoring		\$600,000			Anne LTM
Long-term Monitoring (no action)		\$300,000			Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	665	ac	\$10,640,000
Dredging - 12 hour shifts	1116	Day	8.584615385 \$6,361,200
Dredge Monitoring (Water Quality)	1116	Day	\$3,348,000
Sediment Removal QA	1116	Day	\$1,339,200
Site Restoration	1	Each	\$600,000
Direct Capital:			\$22,558,400
Engineering, Procurement & Construction Management:			2,707,008
Contractor Overhead/Profit:			3,383,760
Total Capital:			\$28,600,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	874,587,113	gal	\$349,835
Water Treatment QA	1,563	day	\$312,600
Direct Capital:			\$1,347,110
Engineering, Procurement & Construction Management:			161,653
Total Capital:			\$1,500,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	1,566,372	ton	\$39,159,300
Lime Purchase	156,638	ton	\$9,398,280
Soil Loading	1,566,372	ton	\$4,385,842
Soil Hauling	1,566,372	ton	\$7,342,369
Tipping Fees (non-TSCA)	1,566,372	ton	\$67,353,996
Direct Capital:			\$127,639,786
Engineering, Procurement & Construction Management:			15,316,774
Total Capital:			\$143,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$180,700,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$803,400
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	665	ac	\$10,640,000
Dredging - 2 12-hour shifts	204	Day	\$5,793,600
Dredge Monitoring (Water Quality)	204	Day	\$1,224,000
Sediment Removal QA	204	Day	\$489,600
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$2,040,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$29,610,600
Engineering, Procurement & Construction Management:			3,553,272
Contractor Overhead/Profit:			4,441,590
Total Capital:			\$37,600,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,505	gpm	\$2,561,265
Water Treatment (Includes Operator)	1,024,798,087	gal	\$409,919
Water Treatment QA	204	day	\$81,600
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$4,392,785
Engineering, Procurement & Construction Management:			527,134
Total Capital:			\$4,900,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Landfill Construction	1	LS	\$4,433,026
Local Siting Fee	783,664	cy	\$3,918,320
Closure	24	acres	\$2,428,711
Direct Capital:			\$10,780,057
Engineering, Procurement & Construction Management:			1,293,607
Total Capital:			\$12,100,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$16,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$63,200,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units		Cost
Site Preparation	1	Each		\$803,400
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	665	ac		\$10,640,000
Dredging - 2 12-hour shifts	204	Day	1.120879121	\$5,793,600
Dredge Monitoring (Water Quality)	204	Day		\$1,224,000
Sediment Removal QA	204	Day		\$489,600
Piping	95,000	ft		\$6,365,000
Road Crossings	4	Each		\$200,000
Booster Pumps	4	Each		\$2,040,000
Winter Over All Equipment	1	year		\$285,000
Site Restoration	1	Each		\$600,000
Direct Capital:				\$29,610,600
Engineering, Procurement & Construction Management:				3,553,272
Contractor Overhead/Profit:				4,441,590
Total Capital:				\$37,600,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	5,010,182	sf	\$9,018,328
Mobilization	1	LS	\$20,000
Clear and Grub	5,010,182	sf	\$230,036
Berm Construction	92,850	cy	\$557,099
Rough Grading	5,010,182	sf	\$1,252,545
Liner Placement	5,010,182	sf	\$7,515,273
Demob/Disposal	1	LS	\$10,000
Regrade	92,850	cy	\$557,099
Seed/Sod	556,687	sy	\$556,687
Direct Capital:			\$19,717,067
Engineering, Procurement & Construction Management:			2,366,048
Total Capital:			\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	2,991	gpm	\$2,561,265
Water Treatment (Includes Operator)	874,587,113	gal	\$349,835
Water Treatment QA	569	day	\$113,800
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$4,364,900
Engineering, Procurement & Construction Management:			523,788
Total Capital:			\$4,900,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	1,566,372	ton	\$39,159,300
Lime Purchase	156,638	ton	\$9,398,280
Sediment Loading	1,566,371	ton	\$4,385,839
Sediment Hauling	1,566,371	ton	\$7,342,365
Landfill Construction	1	LS	\$4,433,026
Local Siting Fee	783,664	cy	\$3,918,320
Closure	24	acres	\$2,428,711
Direct Capital:			\$71,065,840
Engineering, Procurement & Construction Management:			8,527,901
Total Capital:			\$79,600,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$83,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$152,800,000

ALTERNATIVE C3: Dredge with Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	665	ac	\$10,640,000
Dredging - 12 hour shifts	1116	Day	8.584615385 \$6,361,200
Dredge Monitoring (Water Quality)	1116	Day	\$3,348,000
Sediment Removal QA	1116	Day	\$1,339,200
Site Restoration	1	Each	\$600,000
Direct Capital:			\$22,558,400
Engineering, Procurement & Construction Management:			2,707,008
Contractor Overhead/Profit:			3,383,760
Total Capital:			\$28,600,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	469,911	bdt	\$37,592,907
Direct Capital:			\$37,692,907
Engineering, Procurement & Construction Management:			4,523,149
Total Capital:			\$42,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	456	gpm	\$1,380,892
Water Treatment (Includes Operator)	1,024,798,087	gal	\$409,919
Water Treatment QA	1,563	day	\$312,600
Direct Capital:			\$2,103,411
Engineering, Procurement & Construction Management:			252,409
Total Capital:			\$2,400,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	939,823	ton	\$2,631,503
Soil Hauling	939,823	ton	\$4,405,419
Tipping Fees (non-TSCA)	939,823	ton	\$40,412,375
Tipping Fees (TSCA)	0	ton	\$0
Direct Capital:			\$47,449,297
Engineering, Procurement & Construction Management:			5,693,916
Total Capital:			\$53,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$130,800,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units		Cost
Site Preparation	1	Each		\$100,000
Mobilization - Equipment and Silt Curtain	1	LS		\$170,000
Debris Sweep	665	ac		\$10,640,000
Dredging - 12 hour shifts	1116	Day	8.584615385	\$6,361,200
Dredge Monitoring (Water Quality)	1116	Day		\$3,348,000
Sediment Removal QA	1116	Day		\$1,339,200
Site Restoration	1	Each		\$600,000
Direct Capital:				\$22,558,400
Engineering, Procurement & Construction Management:				2,707,008
Contractor Overhead/Profit:				3,383,760
Total Capital:				\$28,600,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	456	gpm		\$752,984
Water Treatment (Includes Operator)	1,024,798,087	gal		\$409,919
Water Treatment QA	1,563	day		\$312,600
Direct Capital:				\$1,475,503
Engineering, Procurement & Construction Management:				177,060
Total Capital:				\$1,700,000

CDF CONSTRUCTION - MENASHA

Capital Items	Quantity	Units		Cost
Mobilization/Site Prep	27,778	sf		\$50,000
Shot Rock/Rip Rap	9,200	lf		\$7,360,000
Sheetpile Placement	276,000	sf		\$5,244,000
Clean Soil Cap	170,000	cy		\$1,700,000
Seeding	250,000	sy		\$250,000
Mitigation	52	acre		\$516,529
Direct Capital:				\$15,120,529
Engineering, Procurement & Construction Management:				1,814,463
Total Capital:				\$16,934,992

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	338,700	\$5,096,178
Total Present Worth, Longer Term O&M Costs			\$15,026,734
Total Project Capital and O&M Cost			\$32,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$66,800,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (12-INCH CUTTERHEAD)**

Capital Items	Quantity	Units		Cost
Site Preparation	1	Each		\$803,400
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	665	ac		\$10,640,000
Dredging - 2 12-hour shifts	204	Day	1.120879121	\$5,793,600
Dredge Monitoring (Water Quality)	204	Day		\$1,224,000
Sediment Removal QA	204	Day		\$489,600
Piping	95,000	ft		\$6,365,000
Road Crossings	4	Each		\$200,000
Booster Pumps	4	Each		\$2,040,000
Winter Over All Equipment	1	year		\$285,000
Site Restoration	1	Each		\$600,000
Direct Capital:				\$29,610,600
Engineering, Procurement & Construction Management:				3,553,272
Contractor Overhead/Profit:				4,441,590
Total Capital:				\$37,600,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units		Cost
Land Lease or Purchase	5,010,182	sf		\$9,018,328
Mobilization	1	LS		\$20,000
Clear and Grub	5,010,182	sf		\$230,036
Berm Construction	92,850	cy		\$557,099
Rough Grading	5,010,182	sf		\$1,252,545
Liner Placement	5,010,182	sf		\$7,515,273
Demob/Disposal	1	LS		\$10,000
Regrade	92,850	cy		\$557,099
Seed/Sod	556,687	sy		\$556,687
Direct Capital:				\$19,717,067
Engineering, Procurement & Construction Management:				2,366,048
Total Capital:				\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	2,991	gpm		\$2,561,265
Water Treatment (Includes Operator)	874,587,113	gal		\$349,835
Water Treatment QA	569	day		\$113,800
Piping	95,000	ft		\$6,365,000
Direct Capital:				\$9,389,900
Engineering, Procurement & Construction Management:				1,126,788
Total Capital:				\$10,500,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units		Cost
Sediment Treatment	1,566,371	ton		\$37,592,907
Soil Loading	1,566,371	ton		\$4,385,839
Soil Hauling	1,566,371	ton		\$1,835,591
Direct Capital:				\$43,814,337
Engineering, Procurement & Construction Management:				\$5,257,720
Total Capital:				\$49,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$123,800,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge and Off-site Disposal

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	877,636	tons	\$5,265,816
Sand Placement	626,883	cy	\$3,761,297
Cobble Purchase and Placement	376,130	cy	\$11,283,892
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$20,611,005
Engineering, Procurement & Construction Management:			2,473,321
Total Capital:			\$23,084,326
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Monitoring/O&M			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$461,687	\$6,946,672
Total Present Worth, Longer Term O&M Costs			\$12,965,191
Total Project Capital and O&M Cost			\$36,000,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	665	ac	\$10,640,000
Dredging - 12 hour shifts	392	Day	\$2,234,400
Dredge Monitoring (Water Quality)	392	Day	\$1,176,000
Sediment Removal QA	392	Day	\$470,400
Site Restoration	1	Each	\$600,000
Direct Capital:			\$15,390,800
Engineering, Procurement & Construction Management:			1,846,896
Contractor Overhead/Profit:			2,308,620
Total Capital:			\$19,500,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	306,859,461	gal	\$122,744
Water Treatment QA	549	Day	\$109,800
Direct Capital:			\$917,219
Engineering, Procurement & Construction Management:			110,066
Total Capital:			\$1,000,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

SEDIMENT DISPOSAL (OFF-SITE)

Capital Items	Quantity	Units	Cost
Solidification	549,581	ton	\$13,739,525
Lime Purchase	54,959	ton	\$3,297,540
Soil Loading	549,581	ton	\$1,538,827
Soil Hauling	549,581	ton	\$2,576,161
Tipping Fees (non-TSCA)	549,581	ton	\$23,631,983
Direct Capital:			\$44,784,036
Engineering, Procurement & Construction Management:			5,374,084
Total Capital:			\$50,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$114,300,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE RAPIDS TO DE PERE
Action Level - 500 ppb

Material Handling Assumptions:

Volume > 500 ppb	776,791	cy	498	ac	592,970	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	1,483,156	cy			1,132,180	m3	
Volume > 250 ppb	1,171,585	cy			894,340	m3	
Volume > 1,000 ppb	586,788	cy			447,930	m3	
Volume > 5000 ppb	186,348	cy			142,250	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.47						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	37.1%	w/w	19.3%	v/v	1.08	tons per cy	
Slurry Density (20% in situ)	9.0%	w/w	3.9%	v/v	0.89	tons per cy	
Dewatered Density (settling pond)	30%	w/w	14.8%	v/v	1.03	tons per cy	Ogden Beeman
Dewatered Density (CDF or landfill)	50%	w/w	28.8%	v/v	1.20	tons per cy	Montgomery Watson
Treated Density	93.7%	w/w	60.0%	v/v	1.33	tons per cy	Foth & VanDyke
HTTD Treatment Capacity	2,198,917	cy			1,650,000	tons	
Cap Volume	492,979	cy			376,320	m3	
Vitrification Treatment Capacity	8,028,121	cy		in situ	6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						
Sales Tax	5.5%						Not Used
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Debris Sweep	\$16,000	per acre					Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					
Hydraulic - 10-inch Cutterhead							
Site Preparation	\$100,000	per dredge launch site					pj
Mobilization - Equipment	\$135,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift					Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					pj
Hydraulic - 2 12-inch Cutterheads							
Site Preparation	\$803,400	LS					Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift					Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift					Ogden Beeman
Winter Over Equipment	\$285,000	per year					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					
Length of Piping	95,000	ft		18	mi		Distance to Town of Holland (map provided by Fred Swed) 11 mi of hard piping plus 7 mi of floating pipe
Piping Purchase/Installation	\$67	per ft					Ogden Beeman
Number of Road Crossings	4	each					pj, review map
Cost per Road Crossing	\$50,000	per crossing					pj, review map
Number of Booster Pumps	4	each					Ogden Beeman
Booster Pump Cost	\$2,500	per day					Ogden Beeman
High Temperature Thermal Desorption							
Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					
Vitrification							
Capital Costs	\$36,000,000	LS					Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year					Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton					Unit Cost Study- Minergy
Capping							
Mobilization/Site Prep	\$200,000						Ogden Beeman
Area	8,117,944	sf	754,200		m2		
Sand Cap Depth	1.7	feet					
Placement Rate	\$6	per cy					Ogden Beeman
Sand Purchase	\$6	per ton					Ole
Sand Density	1.4	tons per cy					
Armored Cap Depth	1.0	feet					
Cobbles	\$30	per cy					Means
Cap Placement QA	\$100,000	LS					Ogden Beeman
Long-term O&M	2%	of capital					pj
Long-term Monitoring	\$400,000	per year					Anne LTM

Nearshore CDF		Arrowhead		Menasha		
Land Lease or Purchase	\$1.8	per sf		\$1.8		Ole
Length	8,000	lf		9,200		Baird
Capping Volume	190,000	cy		170,000		Baird
Seeding Area	280,000	sy		250,000		Baird
Sheetpile Wall Length	8,000	lf		9,200		Baird
Sheetpile Depth	30	ft		30		based on bathymetry
Sheetpile Cost	\$19	per sf		\$19		pj
Shot Rock Berm	\$650	per lf		\$550		Baird
Rip Rap	\$215	per lf		\$250		Baird
Place Treated Material	\$2	per cy		\$2		pj
Clean Soil Cap	\$10	per cy		\$10		Baird
Seeding	\$1	per sy		\$1		Baird
Mitigation	\$10,000	per acre				Tim
	\$10,000	per year				Tim
Long-term Monitoring	\$650,000	per year				Anne LTM
Long-term O&M	2%	of capital				pj
Solidification						
Percent Lime	10.0%	(w/w)				Montgomery Watson
Lime	\$60	per ton	Mixing	\$25	per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)						
Land Lease or Purchase	\$1.80	per sf				Ole
Area (1050 cy dredge rate)	636,049	sf				2 days slurry + 13 wk solids * 2 cell
Perimeter (1050 cy dredge rate)	3,190	lf				assume square
Area (2885 cy dredge rate)	5,010,182	sf				2 days slurry + 13 wk solids * 2
						cells * 2 shifts per day
Perimeter (2885 cy dredge rate)	8,953	lf				assume square
Depth of Material in Dewatering Cell	8	feet				based on size at Arrowhead Park
Cell Retention Time	24	hours				Not Used
Cell Depth	10	feet				
Mobilization	\$20,000	LS				pj
Clear and Grub	\$2,000	per acre				pj
Berm Volume	10.4	cy per lf				2:1 slope, 8-foot top
Berm Construction	\$6	per cy				pj
Rough Grading	\$0.25	per sf				pj
Asphalt Liner	\$1.50	per sf				pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS				pj
Regrade Berm Soils	\$6	per cy				pj
Seed/Sod	\$1	per sy				Baird
Dewatering - Mechanical						
Mobilization	\$100,000					pj
Holding Pond-Centrifuge	\$80	per bone dry ton				Global Dewatering
Water Treatment						
Flow Rate (1 10-inch Dredge; settling pond)	389	gpm				assume operate 24/7
Unit, Purchase (1 10-inch Dredge; settling pond)	\$684,675	LS				pj
Flow Rate (1 10-inch Dredge; CDF)	456	gpm				assume operate 24/7
Unit, Purchase (1 10-inch Dredge; CDF)	\$752,984	LS				pj
Flow Rate (2 12-inch Dredges)	3,505	gpm				assume operate 24/7
Unit, Purchase (2 12-inch Dredges)	\$2,561,265	LS				pj
Flow Rate (2-12-in Dredges; settling pond)	2,991	gpm				assume operate 24/7
Flow Rate (mechanical dewatering)	1,252	gpm				
Unit, Purchase (mechanical dewatering)	\$1,380,892	LS				pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons				pj, 1 sample/day
Water Treatment QA	\$200	per day				Distance from town of Holland to
Length of piping for treated water discharge	20,000	feet				river per map provided by Fred
						Swed
Disposal						
Off-Site Disposal (Existing NR 500 Commercial)						
Load Soil for Hauling	\$2.80	per ton				pj
Round-trip Hauling	2	hours				pj
Round-trip Hauling (to Vitrification Facility)	0.5	hours				pj
Tipping Fee (non-TSCA)	\$43	per ton				St. Paul
Tipping Fee (TSCA)	\$55	per ton				St. Paul
Truck Rate	\$75	per hour				pj
Truck Load	32	tons				pj
Conveyer Facility Construction	1,000,000	LS				pj
Dedicated NR 500 Monofill						
Landfill Construction	\$2,939,208					
Landfill Area	140	acres				
Local Siting Fee	\$5	per cy				
Closure Cap	\$100,000	per acre				
Operating Cost	\$500,000	per year				
Post-closure Monitoring	\$30,000	per year				
Institutional Controls						
Public Education Program	\$100,000					pj
O&M Plans	\$20,000					pj
Deed Restrictions	\$5,000					pj
Annual Costs						
Public Education Program	\$30,000					pj
Maintaining O&M Plans	\$800					pj
Reporting	\$20,000					pj
Long-term Monitoring	\$600,000					Anne LTM
Long-term Monitoring (no action)	\$300,000					Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	498	ac	\$7,968,000
Dredging - 12 hour shifts	740	Day	5.692307692 \$4,218,000
Dredge Monitoring (Water Quality)	740	Day	\$2,220,000
Sediment Removal QA	740	Day	\$888,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$16,164,000
Engineering, Procurement & Construction Management:			1,939,680
Contractor Overhead/Profit:			2,424,600
Total Capital:			\$20,500,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	579,873,337	gal	\$231,949
Water Treatment QA	1,036	day	\$207,200
Direct Capital:			\$1,123,825
Engineering, Procurement & Construction Management:			134,859
Total Capital:			\$1,300,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	1,038,544	ton	\$25,963,600
Lime Purchase	103,855	ton	\$6,231,300
Soil Loading	1,038,544	ton	\$2,907,923
Soil Hauling	1,038,544	ton	\$4,868,175
Tipping Fees (non-TSCA)	1,038,544	ton	\$44,657,392
Direct Capital:			\$84,628,390
Engineering, Procurement & Construction Management:			10,155,407
Total Capital:			\$94,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$124,200,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$803,400
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	498	ac	\$7,968,000
Dredging - 2 12-hour shifts	135	Day	\$3,834,000
Dredge Monitoring (Water Quality)	135	Day	\$810,000
Sediment Removal QA	135	Day	\$324,000
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$1,350,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$23,709,400
Engineering, Procurement & Construction Management:			2,845,128
Contractor Overhead/Profit:			3,556,410
Total Capital:			\$30,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,505	gpm	\$2,561,265
Water Treatment (Includes Operator)	679,467,005	gal	\$271,787
Water Treatment QA	135	day	\$54,000
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$4,227,052
Engineering, Procurement & Construction Management:			507,246
Total Capital:			\$4,700,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Landfill Construction	1	LS	\$2,939,208
Local Siting Fee	519,589	cy	\$2,597,945
Closure	16	acres	\$1,610,296
Direct Capital:			\$7,147,450
Engineering, Procurement & Construction Management:			857,694
Total Capital:			\$8,000,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$12,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$51,400,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$803,400
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	498	ac	\$7,968,000
Dredging - 2 12-hour shifts	135	Day	0.741758242 \$3,834,000
Dredge Monitoring (Water Quality)	135	Day	\$810,000
Sediment Removal QA	135	Day	\$324,000
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$1,350,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$23,709,400
Engineering, Procurement & Construction Management:			2,845,128
Contractor Overhead/Profit:			3,556,410
Total Capital:			\$30,100,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	5,010,182	sf	\$9,018,328
Mobilization	1	LS	\$20,000
Clear and Grub	5,010,182	sf	\$230,036
Berm Construction	92,850	cy	\$557,099
Rough Grading	5,010,182	sf	\$1,252,545
Liner Placement	5,010,182	sf	\$7,515,273
Demob/Disposal	1	LS	\$10,000
Regrade	92,850	cy	\$557,099
Seed/Sod	556,687	sy	\$556,687
Direct Capital:			\$19,717,067
Engineering, Procurement & Construction Management:			2,366,048
Total Capital:			\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	2,991	gpm	\$2,561,265
Water Treatment (Includes Operator)	579,873,337	gal	\$231,949
Water Treatment QA	377	day	\$75,400
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$4,208,615
Engineering, Procurement & Construction Management:			505,034
Total Capital:			\$4,700,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	1,038,544	ton	\$25,963,600
Lime Purchase	103,855	ton	\$6,231,300
Sediment Loading	1,038,544	ton	\$2,907,922
Sediment Hauling	1,038,544	ton	\$4,868,173
Landfill Construction	1	LS	\$2,939,208
Local Siting Fee	519,589	cy	\$2,597,945
Closure	16	acres	\$1,610,296
Direct Capital:			\$47,118,445
Engineering, Procurement & Construction Management:			5,654,213
Total Capital:			\$52,800,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$56,900,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$118,300,000

ALTERNATIVE C3: Dredge with Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	498	ac	\$7,968,000
Dredging - 12 hour shifts	740	Day	\$4,218,000
Dredge Monitoring (Water Quality)	740	Day	\$2,220,000
Sediment Removal QA	740	Day	\$888,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$16,164,000
Engineering, Procurement & Construction Management:			1,939,680
Contractor Overhead/Profit:			2,424,600
Total Capital:			\$20,500,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	311,563	bdt	\$24,925,046
Direct Capital:			\$25,025,046
Engineering, Procurement & Construction Management:			3,003,006
Total Capital:			\$28,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	456	gpm	\$1,380,892
Water Treatment (Includes Operator)	679,467,005	gal	\$271,787
Water Treatment QA	1,036	day	\$207,200
Direct Capital:			\$1,859,879
Engineering, Procurement & Construction Management:			223,185
Total Capital:			\$2,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	623,126	ton	\$1,744,753
Soil Hauling	623,126	ton	\$2,920,904
Tipping Fees (non-TSCA)	623,126	ton	\$26,794,425
Tipping Fees (TSCA)	0	ton	\$0
Direct Capital:			\$31,460,082
Engineering, Procurement & Construction Management:			3,775,210
Total Capital:			\$35,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$90,300,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	498	ac	\$7,968,000
Dredging - 12 hour shifts	740	Day	\$4,218,000
Dredge Monitoring (Water Quality)	740	Day	\$2,220,000
Sediment Removal QA	740	Day	\$888,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$16,164,000
Engineering, Procurement & Construction Management:			1,939,680
Contractor Overhead/Profit:			2,424,600
Total Capital:			\$20,500,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	456	gpm	\$752,984
Water Treatment (Includes Operator)	679,467,005	gal	\$271,787
Water Treatment QA	1,036	day	\$207,200
Direct Capital:			\$1,231,971
Engineering, Procurement & Construction Management:			147,837
Total Capital:			\$1,400,000

CDF CONSTRUCTION - MENASHA

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	27,778	sf	\$50,000
Shot Rock/Rip Rap	9,200	lf	\$7,360,000
Sheetpile Placement	276,000	sf	\$5,244,000
Clean Soil Cap	170,000	cy	\$1,700,000
Seeding	250,000	sy	\$250,000
Mitigation	52	acre	\$516,529
Direct Capital:			\$15,120,529
Engineering, Procurement & Construction Management:			1,814,463
Total Capital:			\$16,934,992
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	338,700	\$5,096,178
Total Present Worth, Longer Term O&M Costs			\$15,026,734
Total Project Capital and O&M Cost			\$32,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$58,400,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (12-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$803,400
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	498	ac	\$7,968,000
Dredging - 2 12-hour shifts	135	Day	\$3,834,000
Dredge Monitoring (Water Quality)	135	Day	\$810,000
Sediment Removal QA	135	Day	\$324,000
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$1,350,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$23,709,400
Engineering, Procurement & Construction Management:			2,845,128
Contractor Overhead/Profit:			3,556,410
Total Capital:			\$30,100,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	5,010,182	sf	\$9,018,328
Mobilization	1	LS	\$20,000
Clear and Grub	5,010,182	sf	\$230,036
Berm Construction	92,850	cy	\$557,099
Rough Grading	5,010,182	sf	\$1,252,545
Liner Placement	5,010,182	sf	\$7,515,273
Demob/Disposal	1	LS	\$10,000
Regrade	92,850	cy	\$557,099
Seed/Sod	556,687	sy	\$556,687
Direct Capital:			\$19,717,067
Engineering, Procurement & Construction Management:			2,366,048
Total Capital:			\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	2,991	gpm	\$2,561,265
Water Treatment (Includes Operator)	579,873,337	gal	\$231,949
Water Treatment QA	377	day	\$75,400
Piping	95,000	ft	\$6,365,000
Direct Capital:			\$9,233,615
Engineering, Procurement & Construction Management:			1,108,034
Total Capital:			\$10,300,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units	Cost
Sediment Treatment	1,038,544	ton	\$24,925,046
Soil Loading	1,038,544	ton	\$2,907,922
Soil Hauling	1,038,544	ton	\$1,217,043
Direct Capital:			\$29,050,012
Engineering, Procurement & Construction Management:			\$3,486,001
Total Capital:			\$32,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$99,500,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge and Off-site Disposal

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	701,551	tons	\$4,209,304
Sand Placement	501,108	cy	\$3,006,646
Cobble Purchase and Placement	300,665	cy	\$9,019,938
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$16,535,888
Engineering, Procurement & Construction Management:			1,984,307
Total Capital:			\$18,520,194
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$370,404	\$5,573,207
Total Present Worth, Longer Term O&M Costs			\$11,591,726
Total Project Capital and O&M Cost			\$30,100,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	498	ac	\$7,968,000
Dredging - 12 hour shifts	271	Day	\$1,544,700
Dredge Monitoring (Water Quality)	271	Day	\$813,000
Sediment Removal QA	271	Day	\$325,200
Site Restoration	1	Each	\$600,000
Direct Capital:			\$11,520,900
Engineering, Procurement & Construction Management:			1,382,508
Contractor Overhead/Profit:			1,728,135
Total Capital:			\$14,600,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	211,864,949	gal	\$84,746
Water Treatment QA	379	Day	\$75,800
Direct Capital:			\$845,221
Engineering, Procurement & Construction Management:			101,427
Total Capital:			\$900,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

SEDIMENT DISPOSAL (OFF-SITE)

Capital Items	Quantity	Units	Cost
Solidification	379,447	ton	\$9,486,175
Lime Purchase	37,945	ton	\$2,276,700
Soil Loading	379,447	ton	\$1,062,452
Soil Hauling	379,447	ton	\$1,778,658
Tipping Fees (non-TSCA)	379,447	ton	\$16,316,221
Direct Capital:			\$30,920,205
Engineering, Procurement & Construction Management:			3,710,425
Total Capital:			\$34,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$87,800,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE RAPIDS TO DE PERE
Action Level - 1,000 ppb

Material Handling Assumptions:

Volume > 1000 ppb	586,788	cy	328	ac	447,930	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	1,483,156	cy			1,132,180	m3	
Volume > 250 ppb	1,171,585	cy			894,340	m3	
Volume > 500 ppb	776,791	cy			592,970	m3	
Volume > 5000 ppb	186,348	cy			142,250	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.47						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	37.1%	w/w	19.3%	v/v	1.08	tons per cy	
Slurry Density (20% in situ)	9.0%	w/w	3.9%	v/v	0.89	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	14.8%	v/v	1.03	tons per cy	Montgomery Watson
Dewatered Density (CDF or landfill)	50%	w/w	28.8%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.7%	w/w	60.0%	v/v	1.33	tons per cy	
HTTD Treatment Capacity	2,198,917	cy			1,650,000	tons	
Cap Volume	416,370	cy			317,840	m3	
Vitrification Treatment Capacity	8,028,121	cy		in situ	6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						
Sales Tax	5.5%						Not Used
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Debris Sweep	\$16,000	per acre					Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site					pj
Mobilization - Equipment	\$135,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift					Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					pj

Hydraulic - 2 12-inch Cutterheads

Site Preparation	\$803,400	LS					Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift					Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift					Ogden Beeman
Winter Over Equipment	\$285,000	per year					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					
Length of Piping	95,000	ft		18	mi		Distance to Town of Holland (map provided by Fred Swed) 11 mi of hard piping plus 7 mi of floating pipe

Piping Purchase/Installation	\$67	per ft					Ogden Beeman
Number of Road Crossings	4	each					pj, review map
Cost per Road Crossing	\$50,000	per crossing					pj, review map
Number of Booster Pumps	4	each					Ogden Beeman
Booster Pump Cost	\$2,500	per day					Ogden Beeman

High Temperature Thermal Desorption

Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					

Vitrification

Capital Costs	\$36,000,000	LS					Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year					Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton					Unit Cost Study- Minergy

Capping

Mobilization/Site Prep	\$200,000						Ogden Beeman
Area	5,945,840	sf	552,400		m2		
Sand Cap Depth	1.7	feet					
Placement Rate	\$6	per cy					Ogden Beeman
Sand Purchase	\$6	per ton					Ole
Sand Density	1.4	tons per cy					
Armored Cap Depth	1.0	feet					
Cobbles	\$30	per cy					Means
Cap Placement QA	\$100,000	LS					Ogden Beeman
Long-term O&M	2%	of capital					pj
Long-term Monitoring	\$400,000	per year					Anne LTM

Nearshore CDF		Arrowhead		Menasha	
Land Lease or Purchase		\$1.8	per sf	\$1.8	Ole
Length		8,000	lf	9,200	Baird
Capping Volume		190,000	cy	170,000	Baird
Seeding Area		280,000	sy	250,000	Baird
Sheetpile Wall Length		8,000	lf	9,200	Baird
Sheetpile Depth		30	ft	30	based on bathymetry
Sheetpile Cost		\$19	per sf	\$19	pj
Shot Rock Berm		\$650	per lf	\$550	Baird
Rip Rap		\$215	per lf	\$250	Baird
Place Treated Material		\$2	per cy	\$2	pj
Clean Soil Cap		\$10	per cy	\$10	Baird
Seeding		\$1	per sy	\$1	Baird
Mitigation		\$10,000	per acre		Tim
		\$10,000	per year		Tim
Long-term Monitoring		\$650,000	per year		Anne LTM
Long-term O&M		2%	of capital		pj
Solidification					
Percent Lime		10.0%	(w/w)		Montgomery Watson
Lime		\$60	per ton	Mixing \$25 per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase		\$1.80	per sf		Ole
Area (1050 cy dredge rate)		636,049	sf		2 days slurry + 13 wk solids * 2 cell
Perimeter (1050 cy dredge rate)		3,190	lf		assume square
Area (2885 cy dredge rate)		5,010,182	sf		2 days slurry + 13 wk solids * 2
					cells * 2 shifts per day
Perimeter (2885 cy dredge rate)		8,953	lf		assume square
Depth of Material in Dewatering Cell		8	feet		based on size at Arrowhead Park
Cell Retention Time		24	hours		Not Used
Cell Depth		10	feet		
Mobilization		\$20,000	LS		pj
Clear and Grub		\$2,000	per acre		pj
Berm Volume		10.4	cy per lf		2:1 slope, 8-foot top
Berm Construction		\$6	per cy		pj
Rough Grading		\$0.25	per sf		pj
Asphalt Liner		\$1.50	per sf		pj, 2 2-inch lifts
Demob/Disposal		\$10,000	LS		pj
Regrade Berm Soils		\$6	per cy		pj
Seed/Sod		\$1	per sy		Baird
Dewatering - Mechanical					
Mobilization		\$100,000			pj
Holding Pond-Centrifuge		\$80	per bone dry ton		Global Dewatering
Water Treatment					
Flow Rate (1 10-inch Dredge; settling pond)		389	gpm		assume operate 24/7
Unit, Purchase (1 10-inch Dredge; settling pond)		\$684,675	LS		pj
Flow Rate (1 10-inch Dredge; CDF)		456	gpm		assume operate 24/7
Unit, Purchase (1 10-inch Dredge; CDF)		\$752,984	LS		pj
Flow Rate (2 12-inch Dredges)		3,505	gpm		assume operate 24/7
Unit, Purchase (2 12-inch Dredges)		\$2,561,265	LS		pj
Flow Rate (2-12-in Dredges; settling pond)		2,991	gpm		assume operate 24/7
Flow Rate (mechanical dewatering)		1,252	gpm		
Unit, Purchase (mechanical dewatering)		\$1,380,892	LS		
Water Treatment (Including Operator)		\$0.40	per 1,000 gallons		pj
Water Treatment QA		\$200	per day		pj, 1 sample/day
Length of piping for treated water discharge		20,000	feet		Distance from town of Holland to river per map provided by Fred Swed
Disposal					
Off-Site Disposal (Existing NR 500 Commercial)					
Load Soil for Hauling		\$2.80	per ton		pj
Round-trip Hauling		2	hours		pj
Round-trip Hauling (to Vittrification Facility)		0.5	hours		pj
Tipping Fee (non-TSCA)		\$43	per ton		St. Paul
Tipping Fee (TSCA)		\$55	per ton		St. Paul
Truck Rate		\$75	per hour		pj
Truck Load		32	tons		pj
Conveyer Facility Construction		1,000,000	LS		pj
Dedicated NR 500 Monofill					
Landfill Construction		\$2,220,280			
Landfill Area		140	acres		
Local Siting Fee		\$5	per cy		
Closure Cap		\$100,000	per acre		
Operating Cost		\$500,000	per year		
Post-closure Monitoring		\$30,000	per year		
Institutional Controls					
Public Education Program		\$100,000			pj
O&M Plans		\$20,000			pj
Deed Restrictions		\$5,000			pj
Annual Costs					
Public Education Program		\$30,000			pj
Maintaining O&M Plans		\$800			pj
Reporting		\$20,000			pj
Long-term Monitoring		\$600,000			Anne LTM
Long-term Monitoring (no action)		\$300,000			Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	328	ac	\$5,248,000
Dredging - 12 hour shifts	559	Day	\$3,186,300
Dredge Monitoring (Water Quality)	559	Day	\$1,677,000
Sediment Removal QA	559	Day	\$670,800
Site Restoration	1	Each	\$600,000
Direct Capital:			\$11,652,100
Engineering, Procurement & Construction Management:			1,398,252
Contractor Overhead/Profit:			1,747,815
Total Capital:			\$14,800,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	438,036,771	gal	\$175,215
Water Treatment QA	783	day	\$156,600
Direct Capital:			\$1,016,490
Engineering, Procurement & Construction Management:			121,979
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	784,517	ton	\$19,612,925
Lime Purchase	78,452	ton	\$4,707,120
Soil Loading	784,517	ton	\$2,196,648
Soil Hauling	784,517	ton	\$3,677,423
Tipping Fees (non-TSCA)	784,517	ton	\$33,734,231
Direct Capital:			\$63,928,347
Engineering, Procurement & Construction Management:			7,671,402
Total Capital:			\$71,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$95,100,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$803,400
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	328	ac	\$5,248,000
Dredging - 2 12-hour shifts	102	Day	\$2,896,800
Dredge Monitoring (Water Quality)	102	Day	\$612,000
Sediment Removal QA	102	Day	\$244,800
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$1,020,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$19,445,000
Engineering, Procurement & Construction Management:			2,333,400
Contractor Overhead/Profit:			2,916,750
Total Capital:			\$24,700,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,505	gpm	\$2,561,265
Water Treatment (Includes Operator)	513,269,905	gal	\$205,308
Water Treatment QA	102	day	\$40,800
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$4,147,373
Engineering, Procurement & Construction Management:			497,685
Total Capital:			\$4,600,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Landfill Construction	1	LS	\$2,220,280
Local Siting Fee	392,498	cy	\$1,962,490
Closure	12	acres	\$1,216,419
Direct Capital:			\$5,399,189
Engineering, Procurement & Construction Management:			647,903
Total Capital:			\$6,000,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$10,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$43,900,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$803,400
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	328	ac	\$5,248,000
Dredging - 2 12-hour shifts	102	Day	0.56043956 \$2,896,800
Dredge Monitoring (Water Quality)	102	Day	\$612,000
Sediment Removal QA	102	Day	\$244,800
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$1,020,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$19,445,000
Engineering, Procurement & Construction Management:			2,333,400
Contractor Overhead/Profit:			2,916,750
Total Capital:			\$24,700,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	5,010,182	sf	\$9,018,328
Mobilization	1	LS	\$20,000
Clear and Grub	5,010,182	sf	\$230,036
Berm Construction	92,850	cy	\$557,099
Rough Grading	5,010,182	sf	\$1,252,545
Liner Placement	5,010,182	sf	\$7,515,273
Demob/Disposal	1	LS	\$10,000
Regrade	92,850	cy	\$557,099
Seed/Sod	556,687	sy	\$556,687
Direct Capital:			\$19,717,067
Engineering, Procurement & Construction Management:			2,366,048
Total Capital:			\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	2,991	gpm	\$2,561,265
Water Treatment (Includes Operator)	438,036,771	gal	\$175,215
Water Treatment QA	285	day	\$57,000
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$4,133,480
Engineering, Procurement & Construction Management:			496,018
Total Capital:			\$4,600,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	784,517	ton	\$19,612,925
Lime Purchase	78,452	ton	\$4,707,120
Sediment Loading	784,517	ton	\$2,196,647
Sediment Hauling	784,517	ton	\$3,677,422
Landfill Construction	1	LS	\$2,220,280
Local Siting Fee	392,498	cy	\$1,962,490
Closure	12	acres	\$1,216,419
Direct Capital:			\$35,593,303
Engineering, Procurement & Construction Management:			4,271,196
Total Capital:			\$39,900,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$44,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$99,900,000

ALTERNATIVE C3: Dredge with Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	328	ac	\$5,248,000
Dredging - 12 hour shifts	559	Day	\$3,186,300
Dredge Monitoring (Water Quality)	559	Day	\$1,677,000
Sediment Removal QA	559	Day	\$670,800
Site Restoration	1	Each	\$600,000
Direct Capital:			\$11,652,100
Engineering, Procurement & Construction Management:			1,398,252
Contractor Overhead/Profit:			1,747,815
Total Capital:			\$14,800,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	235,355	bdt	\$18,828,399
Direct Capital:			\$18,928,399
Engineering, Procurement & Construction Management:			2,271,408
Total Capital:			\$21,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	456	gpm	\$1,380,892
Water Treatment (Includes Operator)	513,269,905	gal	\$205,308
Water Treatment QA	783	day	\$156,600
Direct Capital:			\$1,742,800
Engineering, Procurement & Construction Management:			209,136
Total Capital:			\$2,000,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	470,710	ton	\$1,317,988
Soil Hauling	470,710	ton	\$2,206,453
Tipping Fees (non-TSCA)	470,710	ton	\$20,240,529
Tipping Fees (TSCA)	0	ton	\$0
Direct Capital:			\$23,764,970
Engineering, Procurement & Construction Management:			2,851,796
Total Capital:			\$26,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	Cost
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$69,100,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	328	ac	\$5,248,000
Dredging - 12 hour shifts	559	Day	\$3,186,300
Dredge Monitoring (Water Quality)	559	Day	\$1,677,000
Sediment Removal QA	559	Day	\$670,800
Site Restoration	1	Each	\$600,000
Direct Capital:			\$11,652,100
Engineering, Procurement & Construction Management:			1,398,252
Contractor Overhead/Profit:			1,747,815
Total Capital:			\$14,800,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	456	gpm	\$752,984
Water Treatment (Includes Operator)	513,269,905	gal	\$205,308
Water Treatment QA	783	day	\$156,600
Direct Capital:			\$1,114,892
Engineering, Procurement & Construction Management:			133,787
Total Capital:			\$1,200,000

CDF CONSTRUCTION - MENASHA

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	27,778	sf	\$50,000
Shot Rock/Rip Rap	9,200	lf	\$7,360,000
Sheetpile Placement	276,000	sf	\$5,244,000
Clean Soil Cap	170,000	cy	\$1,700,000
Seeding	250,000	sy	\$250,000
Mitigation	52	acre	\$516,529
Direct Capital:			\$15,120,529
Engineering, Procurement & Construction Management:			1,814,463
Total Capital:			\$16,934,992

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	338,700	\$5,096,178
Total Present Worth, Longer Term O&M Costs			\$15,026,734
Total Project Capital and O&M Cost			\$32,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$52,500,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (12-INCH CUTTERHEAD)**

Capital Items	Quantity	Units		Cost
Site Preparation	1	Each		\$803,400
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	328	ac		\$5,248,000
Dredging - 2 12-hour shifts	102	Day	0.56043956	\$2,896,800
Dredge Monitoring (Water Quality)	102	Day		\$612,000
Sediment Removal QA	102	Day		\$244,800
Piping	95,000	ft		\$6,365,000
Road Crossings	4	Each		\$200,000
Booster Pumps	4	Each		\$1,020,000
Winter Over All Equipment	1	year		\$285,000
Site Restoration	1	Each		\$600,000
Direct Capital:				\$19,445,000
Engineering, Procurement & Construction Management:				2,333,400
Contractor Overhead/Profit:				2,916,750
Total Capital:				\$24,700,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units		Cost
Land Lease or Purchase	5,010,182	sf		\$9,018,328
Mobilization	1	LS		\$20,000
Clear and Grub	5,010,182	sf		\$230,036
Berm Construction	92,850	cy		\$557,099
Rough Grading	5,010,182	sf		\$1,252,545
Liner Placement	5,010,182	sf		\$7,515,273
Demob/Disposal	1	LS		\$10,000
Regrade	92,850	cy		\$557,099
Seed/Sod	556,687	sy		\$556,687
Direct Capital:				\$19,717,067
Engineering, Procurement & Construction Management:				2,366,048
Total Capital:				\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	2,991	gpm		\$2,561,265
Water Treatment (Includes Operator)	438,036,771	gal		\$175,215
Water Treatment QA	285	day		\$57,000
Piping	95,000	ft		\$6,365,000
Direct Capital:				\$9,158,480
Engineering, Procurement & Construction Management:				1,099,018
Total Capital:				\$10,300,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units		Cost
Sediment Treatment	784,517	ton		\$18,828,399
Soil Loading	784,517	ton		\$2,196,647
Soil Hauling	784,517	ton		\$919,355
Direct Capital:				\$21,944,401
Engineering, Procurement & Construction Management:				2,633,328
Total Capital:				\$24,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$86,200,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge and Off-site Disposal

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	513,838	tons	\$3,083,028
Sand Placement	367,027	cy	\$2,202,163
Cobble Purchase and Placement	220,216	cy	\$6,606,488
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$12,191,679
Engineering, Procurement & Construction Management:			1,463,001
Total Capital:			\$13,654,680
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$273,094	\$4,109,048
Total Present Worth, Longer Term O&M Costs			\$10,127,566
Total Project Capital and O&M Cost			\$23,800,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	328	ac	\$5,248,000
Dredging - 12 hour shifts	163	Day	\$929,100
Dredge Monitoring (Water Quality)	163	Day	\$489,000
Sediment Removal QA	163	Day	\$195,600
Site Restoration	1	Each	\$600,000
Direct Capital:			\$7,731,700
Engineering, Procurement & Construction Management:			927,804
Contractor Overhead/Profit:			1,159,755
Total Capital:			\$9,800,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	127,216,760	gal	\$50,887
Water Treatment QA	228	Day	\$45,600
Direct Capital:			\$781,162
Engineering, Procurement & Construction Management:			93,739
Total Capital:			\$900,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

SEDIMENT DISPOSAL (OFF-SITE)

Capital Items	Quantity	Units	Cost
Solidification	227,844	ton	\$5,696,100
Lime Purchase	22,785	ton	\$1,367,100
Soil Loading	227,844	ton	\$637,963
Soil Hauling	227,844	ton	\$1,068,019
Tipping Fees (non-TSCA)	227,844	ton	\$9,797,292
Direct Capital:			\$18,566,474
Engineering, Procurement & Construction Management:			2,227,977
Total Capital:			\$20,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$62,900,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
LITTLE RAPIDS TO DE PERE
Action Level - 5,000 ppb

Material Handling Assumptions:

Volume > 5000 ppb	186,348	cy	173	ac	142,250	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	1,483,156	cy			1,132,180	m3	
Volume > 250 ppb	1,171,585	cy			894,340	m3	
Volume > 500 ppb	776,791	cy			592,970	m3	
Volume > 1000 ppb	586,788	cy			447,930	m3	
Volume > 50,000 ppb	0	cy			0	m3	
Solids Specific Gravity	2.47						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	37.1%	w/w	19.3%	v/v	1.08	tons per cy	
Slurry Density (20% in situ)	9.0%	w/w	3.9%	v/v	0.89	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	14.8%	v/v	1.03	tons per cy	Montgomery Watson
Dewatered Density (CDF or landfill)	50%	w/w	28.8%	v/v	1.20	tons per cy	Foth & VanDyke
Treated Density	93.7%	w/w	60.0%	v/v	1.33	tons per cy	
HTTD Treatment Capacity	2,198,917	cy			1,650,000	tons	
Cap Volume	136,188	cy			103,960	m3	
Vitrification Treatment Capacity	8,028,121	cy	in situ		6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						
Sales Tax	5.5%						Not Used
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Debris Sweep	\$16,000	per acre					Ogden Beeman
Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					

Hydraulic - 10-inch Cutterhead

Site Preparation	\$100,000	per dredge launch site					pj
Mobilization - Equipment	\$135,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (10 hours)	\$5,700	per shift					Ogden Beeman
Dredge Rate	1050	cy in situ per 10 hour shift					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					pj

Hydraulic - 2 12-inch Cutterheads

Site Preparation	\$803,400	LS					Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift					Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift					Ogden Beeman
Winter Over Equipment	\$285,000	per year					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					
Length of Piping	95,000	ft		18	mi		Distance to Town of Holland (map provided by Fred Swed) 11 mi of hard piping plus 7 mi of floating pipe

Piping Purchase/Installation	\$67	per ft					Ogden Beeman
Number of Road Crossings	4	each					pj, review map
Cost per Road Crossing	\$50,000	per crossing					pj, review map
Number of Booster Pumps	4	each					Ogden Beeman
Booster Pump Cost	\$2,500	per day					Ogden Beeman

High Temperature Thermal Desorption

Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					

Vitrification

Capital Costs	\$36,000,000	LS					Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year					Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton					Unit Cost Study- Minergy

Capping

Mobilization/Site Prep	\$200,000						Ogden Beeman
Area	2,943,858	sf	273,500		m2		
Sand Cap Depth	1.7	feet					
Placement Rate	\$6	per cy					Ogden Beeman
Sand Purchase	\$6	per ton					Ole
Sand Density	1.4	tons per cy					
Armored Cap Depth	1.0	feet					
Cobbles	\$30	per cy					Means
Cap Placement QA	\$100,000	LS					Ogden Beeman
Long-term O&M	2%	of capital					pj
Long-term Monitoring	\$400,000	per year					Anne LTM

Nearshore CDF		Arrowhead		Menasha	
Land Lease or Purchase	\$1.8	per sf		\$1.8	Ole
Length	8,000	lf		9,200	Baird
Capping Volume	190,000	cy		170,000	Baird
Seeding Area	280,000	sy		250,000	Baird
Sheetpile Wall Length	8,000	lf		9,200	Baird
Sheetpile Depth	30	ft		30	based on bathymetry
Sheetpile Cost	\$19	per sf		\$19	pj
Shot Rock Berm	\$650	per lf		\$550	Baird
Rip Rap	\$215	per lf		\$250	Baird
Place Treated Material	\$2	per cy		\$2	pj
Clean Soil Cap	\$10	per cy		\$10	Baird
Seeding	\$1	per sy		\$1	Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10.0%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area (1050 cy dredge rate)	636,049	sf			2 days slurry + 13 wk solids * 2 cell
Perimeter (1050 cy dredge rate)	3,190	lf			assume square
Area (2885 cy dredge rate)	5,010,182	sf			2 days slurry + 13 wk solids * 2
					cells * 2 shifts per day
Perimeter (2885 cy dredge rate)	8,953	lf			assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			pj
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Asphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Water Treatment					
Flow Rate (1 10-inch Dredge; settling pond)	389	gpm			assume operate 24/7
Unit, Purchase (1 10-inch Dredge; settling pond)	\$684,675	LS			pj
Flow Rate (1 10-inch Dredge; CDF)	456	gpm			assume operate 24/7
Unit, Purchase (1 10-inch Dredge; CDF)	\$752,984	LS			pj
Flow Rate (2 12-inch Dredges)	3,505	gpm			assume operate 24/7
Unit, Purchase (2 12-inch Dredges)	\$2,561,265	LS			pj
Flow Rate (2-12-in Dredges; settling pond)	2,991	gpm			assume operate 24/7
Flow Rate (mechanical dewatering)	1,252	gpm			
Unit, Purchase (mechanical dewatering)	\$1,380,892	LS			pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj, 1 sample/day
Water Treatment QA	\$200	per day			Distance from town of Holland to
Length of piping for treated water discharge	20,000	feet			river per map provided by Fred
					Swed
Disposal					
Off-Site Disposal (Existing NR 500 Commercial)					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Conveyer Facility Construction	1,000,000	LS			pj
Dedicated NR 500 Monofill					
Landfill Construction	\$705,099				
Landfill Area	140	acres			
Local Siting Fee	\$5	per cy			
Closure Cap	\$100,000	per acre			
Operating Cost	\$500,000	per year			
Post-closure Monitoring	\$30,000	per year			
Institutional Controls					
Public Education Program	\$100,000				pj
O&M Plans	\$20,000				pj
Deed Restrictions	\$5,000				pj
Annual Costs					
Public Education Program	\$30,000				pj
Maintaining O&M Plans	\$800				pj
Reporting	\$20,000				pj
Long-term Monitoring	\$600,000				Anne LTM
Long-term Monitoring (no action)	\$300,000				Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	173	ac	\$2,768,000
Dredging - 12 hour shifts	178	Day	1.369230769 \$1,014,600
Dredge Monitoring (Water Quality)	178	Day	\$534,000
Sediment Removal QA	178	Day	\$213,600
Site Restoration	1	Each	\$600,000
Direct Capital:			\$5,400,200
Engineering, Procurement & Construction Management:			648,024
Contractor Overhead/Profit:			810,030
Total Capital:			\$6,900,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	139,108,188	gal	\$55,643
Water Treatment QA	249	day	\$49,800
Direct Capital:			\$790,119
Engineering, Procurement & Construction Management:			94,814
Total Capital:			\$900,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	249,141	ton	\$6,228,525
Lime Purchase	24,915	ton	\$1,494,900
Soil Loading	249,141	ton	\$697,595
Soil Hauling	249,141	ton	\$1,167,848
Tipping Fees (non-TSCA)	249,141	ton	\$10,713,063
Direct Capital:			\$20,301,931
Engineering, Procurement & Construction Management:			2,436,232
Total Capital:			\$22,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$38,100,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$803,400
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	173	ac	\$2,768,000
Dredging - 2 12-hour shifts	33	Day	\$937,200
Dredge Monitoring (Water Quality)	33	Day	\$198,000
Sediment Removal QA	33	Day	\$79,200
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$330,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$13,735,800
Engineering, Procurement & Construction Management:			1,648,296
Contractor Overhead/Profit:			2,060,370
Total Capital:			\$17,400,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,505	gpm	\$2,561,265
Water Treatment (Includes Operator)	163,000,121	gal	\$65,200
Water Treatment QA	33	day	\$13,200
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$3,979,666
Engineering, Procurement & Construction Management:			477,560
Total Capital:			\$4,500,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Landfill Construction	1	LS	\$705,099
Local Siting Fee	124,646	cy	\$623,230
Closure	4	acres	\$386,300
Direct Capital:			\$1,714,628
Engineering, Procurement & Construction Management:			205,755
Total Capital:			\$1,900,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$6,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$32,400,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facility

SEDIMENT REMOVAL (12-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$803,400
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	173	ac	\$2,768,000
Dredging - 2 12-hour shifts	33	Day	0.181318681 \$937,200
Dredge Monitoring (Water Quality)	33	Day	\$198,000
Sediment Removal QA	33	Day	\$79,200
Piping	95,000	ft	\$6,365,000
Road Crossings	4	Each	\$200,000
Booster Pumps	4	Each	\$330,000
Winter Over All Equipment	1	year	\$285,000
Site Restoration	1	Each	\$600,000
Direct Capital:			\$13,735,800
Engineering, Procurement & Construction Management:			1,648,296
Contractor Overhead/Profit:			2,060,370
Total Capital:			\$17,400,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	5,010,182	sf	\$9,018,328
Mobilization	1	LS	\$20,000
Clear and Grub	5,010,182	sf	\$230,036
Berm Construction	92,850	cy	\$557,099
Rough Grading	5,010,182	sf	\$1,252,545
Liner Placement	5,010,182	sf	\$7,515,273
Demob/Disposal	1	LS	\$10,000
Regrade	92,850	cy	\$557,099
Seed/Sod	556,687	sy	\$556,687
Direct Capital:			\$19,717,067
Engineering, Procurement & Construction Management:			2,366,048
Total Capital:			\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	2,991	gpm	\$2,561,265
Water Treatment (Includes Operator)	139,108,188	gal	\$55,643
Water Treatment QA	91	day	\$18,200
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$3,975,109
Engineering, Procurement & Construction Management:			477,013
Total Capital:			\$4,500,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	249,141	ton	\$6,228,525
Lime Purchase	24,915	ton	\$1,494,900
Sediment Loading	249,140	ton	\$697,593
Sediment Hauling	249,140	ton	\$1,167,846
Landfill Construction	1	LS	\$705,099
Local Siting Fee	124,646	cy	\$623,230
Closure	4	acres	\$386,300
Direct Capital:			\$11,303,493
Engineering, Procurement & Construction Management:			1,356,419
Total Capital:			\$12,700,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$451,389
Total Present Worth, Longer Term O&M Costs			\$4,131,432
Total Project Capital and O&M Cost			\$16,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$65,300,000

ALTERNATIVE C3: Dredge with Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	173	ac	\$2,768,000
Dredging - 12 hour shifts	178	Day	1.369230769 \$1,014,600
Dredge Monitoring (Water Quality)	178	Day	\$534,000
Sediment Removal QA	178	Day	\$213,600
Site Restoration	1	Each	\$600,000
Direct Capital:			\$5,400,200
Engineering, Procurement & Construction Management:			648,024
Contractor Overhead/Profit:			810,030
Total Capital:			\$6,900,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	74,742	bdt	\$5,979,371
Direct Capital:			\$6,079,371
Engineering, Procurement & Construction Management:			729,525
Total Capital:			\$6,800,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	456	gpm	\$1,380,892
Water Treatment (Includes Operator)	163,000,121	gal	\$65,200
Water Treatment QA	249	day	\$49,800
Direct Capital:			\$1,495,892
Engineering, Procurement & Construction Management:			179,507
Total Capital:			\$1,700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	149,484	ton	\$418,556
Soil Hauling	149,484	ton	\$700,708
Tipping Fees (non-TSCA)	149,484	ton	\$6,427,824
Tipping Fees (TSCA)	0	ton	\$0
Direct Capital:			\$7,547,088
Engineering, Procurement & Construction Management:			905,651
Total Capital:			\$8,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$28,400,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (10-INCH CUTTERHEAD)**

Capital Items	Quantity	Units		Cost
Site Preparation	1	Each		\$100,000
Mobilization - Equipment and Silt Curtain	1	LS		\$170,000
Debris Sweep	173	ac		\$2,768,000
Dredging - 12 hour shifts	178	Day	1.369230769	\$1,014,600
Dredge Monitoring (Water Quality)	178	Day		\$534,000
Sediment Removal QA	178	Day		\$213,600
Site Restoration	1	Each		\$600,000
Direct Capital:				\$5,400,200
Engineering, Procurement & Construction Management:				648,024
Contractor Overhead/Profit:				810,030
Total Capital:				\$6,900,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	456	gpm		\$752,984
Water Treatment (Includes Operator)	163,000,121	gal		\$65,200
Water Treatment QA	249	day		\$49,800
Direct Capital:				\$867,984
Engineering, Procurement & Construction Management:				104,158
Total Capital:				\$1,000,000

CDF CONSTRUCTION - MENASHA

Capital Items	Quantity	Units		Cost
Mobilization/Site Prep	27,778	sf		\$50,000
Shot Rock/Rip Rap	9,200	lf		\$7,360,000
Sheetpile Placement	276,000	sf		\$5,244,000
Clean Soil Cap	170,000	cy		\$1,700,000
Seeding	250,000	sy		\$250,000
Mitigation	52	acre		\$516,529
Direct Capital:				\$15,120,529
Engineering, Procurement & Construction Management:				1,814,463
Total Capital:				\$16,934,992

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	338,700	\$5,096,178
Total Present Worth, Longer Term O&M Costs			\$15,026,734
Total Project Capital and O&M Cost			\$32,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$44,400,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment**SEDIMENT REMOVAL (12-INCH CUTTERHEAD)**

Capital Items	Quantity	Units		Cost
Site Preparation	1	Each		\$803,400
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	173	ac		\$2,768,000
Dredging - 2 12-hour shifts	33	Day	0.181318681	\$937,200
Dredge Monitoring (Water Quality)	33	Day		\$198,000
Sediment Removal QA	33	Day		\$79,200
Piping	95,000	ft		\$6,365,000
Road Crossings	4	Each		\$200,000
Booster Pumps	4	Each		\$330,000
Winter Over All Equipment	1	year		\$285,000
Site Restoration	1	Each		\$600,000
Direct Capital:				\$13,735,800
Engineering, Procurement & Construction Management:				1,648,296
Contractor Overhead/Profit:				2,060,370
Total Capital:				\$17,400,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units		Cost
Land Lease or Purchase	5,010,182	sf		\$9,018,328
Mobilization	1	LS		\$20,000
Clear and Grub	5,010,182	sf		\$230,036
Berm Construction	92,850	cy		\$557,099
Rough Grading	5,010,182	sf		\$1,252,545
Liner Placement	5,010,182	sf		\$7,515,273
Demob/Disposal	1	LS		\$10,000
Regrade	92,850	cy		\$557,099
Seed/Sod	556,687	sy		\$556,687
Direct Capital:				\$19,717,067
Engineering, Procurement & Construction Management:				2,366,048
Total Capital:				\$22,100,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	2,991	gpm		\$2,561,265
Water Treatment (Includes Operator)	139,108,188	gal		\$55,643
Water Treatment QA	91	day		\$18,200
Piping	95,000	ft		\$6,365,000
Direct Capital:				\$9,000,109
Engineering, Procurement & Construction Management:				1,080,013
Total Capital:				\$10,100,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units		Cost
Sediment Treatment	249,140	ton		\$5,979,371
Soil Loading	249,140	ton		\$697,593
Soil Hauling	249,140	ton		\$291,961
Direct Capital:				\$6,968,926
Engineering, Procurement & Construction Management:				\$836,271
Total Capital:				\$7,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$61,900,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible, Dredge and Off-site Disposal

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	254,407	tons	\$1,526,445
Sand Placement	181,720	cy	\$1,090,318
Cobble Purchase and Placement	109,032	cy	\$3,270,953
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$6,187,716
Engineering, Procurement & Construction Management:			742,526
Total Capital:			\$6,930,242
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$138,605	\$2,085,489
Total Present Worth, Longer Term O&M Costs			\$8,104,008
Total Project Capital and O&M Cost			\$15,000,000

SEDIMENT REMOVAL (10-INCH CUTTERHEAD)

Capital Items	Quantity	Units	Cost
Site Preparation	1	Each	\$100,000
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Debris Sweep	173	ac	\$2,768,000
Dredging - 12 hour shifts	48	Day	\$273,600
Dredge Monitoring (Water Quality)	48	Day	\$144,000
Sediment Removal QA	48	Day	\$57,600
Site Restoration	1	Each	\$600,000
Direct Capital:			\$4,113,200
Engineering, Procurement & Construction Management:			493,584
Contractor Overhead/Profit:			616,980
Total Capital:			\$5,200,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	636,049	sf	\$1,144,889
Mobilization	1	LS	\$20,000
Clear and Grub	636,049	sf	\$29,203
Berm Construction	33,083	cy	\$198,496
Rough Grading	636,049	sf	\$159,012
Liner Placement	636,049	sf	\$954,074
Demob/Disposal	1	LS	\$10,000
Regrade	33,083	cy	\$198,496
Seed/Sod	70,672	sy	\$70,672
Direct Capital:			\$2,784,842
Engineering, Procurement & Construction Management:			334,181
Total Capital:			\$3,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	389	gpm	\$684,675
Water Treatment (Includes Operator)	37,444,306	gal	\$14,978
Water Treatment QA	67	Day	\$13,400
Direct Capital:			\$713,053
Engineering, Procurement & Construction Management:			85,566
Total Capital:			\$800,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

SEDIMENT DISPOSAL (OFF-SITE)

Capital Items	Quantity	Units	Cost
Solidification	67,063	ton	\$1,676,575
Lime Purchase	6,707	ton	\$402,420
Soil Loading	67,063	ton	\$187,776
Soil Hauling	67,063	ton	\$314,358
Tipping Fees (non-TSCA)	67,063	ton	\$2,883,709
Direct Capital:			\$5,464,838
Engineering, Procurement & Construction Management:			655,781
Total Capital:			\$6,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$34,700,000

**Table 7-10 Cost Summary for Remedial Alternatives - De Pere to Green Bay
125 ppb**

Alternative	Dredge Volume (cy)	TSCA Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Bayport Closure ¹	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	---	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	---	\$9,900,000	\$1,980,000	\$11,880,000
C1	6,868,500	240,778	---	\$100,500,000	---	---	\$700,000	---	---	\$659,200,000	\$4,500,000	\$4,200,000	\$769,100,000	\$153,820,000	\$922,920,000
C2A	6,868,500	240,778	\$109,400,000	---	---	---	\$7,700,000	---	---	\$70,200,000	\$4,500,000	\$4,200,000	\$196,000,000	\$39,200,000	\$235,200,000
C2B	6,868,500	240,778	\$109,400,000	---	---	\$19,900,000	\$7,300,000	---	---	\$419,200,000	\$4,500,000	\$4,200,000	\$564,500,000	\$112,900,000	\$677,400,000
C3	6,868,500	240,778	\$85,400,000	---	---	\$217,700,000	\$6,400,000	---	---	\$277,000,000	\$4,500,000	\$4,200,000	\$595,200,000	\$119,040,000	\$714,240,000
D	6,868,500	240,778	---	\$100,500,000	---	---	\$1,200,000	---	\$39,200,000	\$462,200,000	\$4,500,000	\$4,200,000	\$611,800,000	\$122,360,000	\$734,160,000
E	6,868,500	240,778	\$109,400,000	---	---	\$19,900,000	\$12,900,000	\$253,600,000	---	---	\$4,500,000	\$4,200,000	\$404,500,000	\$80,900,000	\$485,400,000
F	4,680,565	240,778	---	\$69,500,000	\$67,800,000	---	\$1,100,000	---	\$39,200,000	\$246,300,000	\$4,500,000	\$4,200,000	\$432,600,000	\$86,520,000	\$519,120,000

250 ppb

Alternative	Dredge Volume (cy)	TSCA Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Bayport Closure ¹	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	---	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	---	\$9,900,000	\$1,980,000	\$11,880,000
C1	6,449,065	240,778	---	\$94,600,000	---	---	\$700,000	---	---	\$619,100,000	\$4,500,000	\$4,200,000	\$723,100,000	\$144,620,000	\$867,720,000
C2A	6,449,065	240,778	\$104,500,000	---	---	---	\$7,500,000	---	---	\$66,200,000	\$4,500,000	\$4,200,000	\$186,900,000	\$37,380,000	\$224,280,000
C2B	6,449,065	240,778	\$104,500,000	---	---	\$19,900,000	\$7,100,000	---	---	\$393,900,000	\$4,500,000	\$4,200,000	\$534,100,000	\$106,820,000	\$640,920,000
C3	6,449,065	240,778	\$81,500,000	---	---	\$204,400,000	\$6,200,000	---	---	\$260,200,000	\$4,500,000	\$4,200,000	\$561,000,000	\$112,200,000	\$673,200,000
D	6,449,065	240,778	---	\$94,600,000	---	---	\$1,100,000	---	\$39,200,000	\$422,800,000	\$4,500,000	\$4,200,000	\$566,400,000	\$113,280,000	\$679,680,000
E	6,449,065	240,778	\$104,500,000	---	---	\$19,900,000	\$12,800,000	\$238,100,000	---	---	\$4,500,000	\$4,200,000	\$384,000,000	\$76,800,000	\$460,800,000
F	4,433,446	240,778	---	\$66,000,000	\$66,200,000	---	\$1,100,000	---	\$39,200,000	\$222,700,000	\$4,500,000	\$4,200,000	\$403,900,000	\$80,780,000	\$484,680,000

500 ppb

Alternative	Dredge Volume (cy)	TSCA Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Bayport Closure ¹	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	---	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	---	\$9,900,000	\$1,980,000	\$11,880,000
C1	6,169,458	240,778	---	\$90,600,000	---	---	\$600,000	---	---	\$592,400,000	\$4,500,000	\$4,200,000	\$692,300,000	\$138,460,000	\$830,760,000
C2A	6,169,458	240,778	\$100,900,000	---	---	---	\$7,300,000	---	---	\$63,500,000	\$4,500,000	\$4,200,000	\$180,400,000	\$36,080,000	\$216,480,000
C2B	6,169,458	240,778	\$100,900,000	---	---	\$19,900,000	\$7,000,000	---	---	\$377,000,000	\$4,500,000	\$4,200,000	\$513,500,000	\$102,700,000	\$616,200,000
C3	6,169,458	240,778	\$78,500,000	---	---	\$195,600,000	\$6,000,000	---	---	\$249,000,000	\$4,500,000	\$4,200,000	\$537,800,000	\$107,560,000	\$645,360,000
D	6,169,458	240,778	---	\$90,600,000	---	---	\$1,100,000	---	\$39,200,000	\$396,600,000	\$4,500,000	\$4,200,000	\$536,200,000	\$107,240,000	\$643,440,000
E	6,169,458	240,778	\$100,900,000	---	---	\$19,900,000	\$12,700,000	\$227,800,000	---	---	\$4,500,000	\$4,200,000	\$370,000,000	\$74,000,000	\$444,000,000
F	4,242,710	240,778	---	\$63,300,000	\$65,100,000	---	\$1,100,000	---	\$39,200,000	\$204,500,000	\$4,500,000	\$4,200,000	\$381,900,000	\$76,380,000	\$458,280,000

1000 ppb

Alternative	Dredge Volume (cy)	TSCA Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Bayport Closure ¹	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	---	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	---	\$9,900,000	\$1,980,000	\$11,880,000
C1	5,879,529	240,778	---	\$86,500,000	---	---	\$600,000	---	---	\$564,800,000	\$4,500,000	\$4,200,000	\$660,600,000	\$132,120,000	\$792,720,000
C2A	5,879,529	240,778	\$96,900,000	---	---	---	\$7,200,000	---	---	\$60,700,000	\$4,500,000	\$4,200,000	\$173,500,000	\$34,700,000	\$208,200,000
C2B	5,879,529	240,778	\$96,900,000	---	---	\$19,900,000	\$6,900,000	---	---	\$359,400,000	\$4,500,000	\$4,200,000	\$491,800,000	\$98,360,000	\$590,160,000
C3	5,879,529	240,778	\$75,100,000	---	---	\$186,400,000	\$5,900,000	---	---	\$237,400,000	\$4,500,000	\$4,200,000	\$513,500,000	\$102,700,000	\$616,200,000
D	5,879,529	240,778	---	\$86,500,000	---	---	\$1,100,000	---	\$39,200,000	\$369,600,000	\$4,500,000	\$4,200,000	\$505,100,000	\$101,020,000	\$606,120,000
E	5,879,529	240,778	\$96,900,000	---	---	\$19,900,000	\$12,500,000	\$217,100,000	---	---	\$4,500,000	\$4,200,000	\$355,100,000	\$71,020,000	\$426,120,000
F	4,046,276	240,778	---	\$60,500,000	\$61,900,000	---	\$1,100,000	---	\$39,200,000	\$185,700,000	\$4,500,000	\$4,200,000	\$357,100,000	\$71,420,000	\$428,520,000

5000 ppb

Alternative	Dredge Volume (cy)	TSCA Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Capping	Dewatering	Water Treatment	Thermal Treatment	CDF Construction	Off-site Disposal	Institutional Controls	Bayport Closure ¹	Subtotal	20% Contingency	TOTAL
A	0	0	---	---	---	---	---	---	---	---	\$4,500,000	---	\$4,500,000	\$900,000	\$5,400,000
B	0	0	---	---	---	---	---	---	---	---	\$9,900,000	---	\$9,900,000	\$1,980,000	\$11,880,000
C1	4,517,391	240,778	---	\$67,200,000	---	---	\$500,000	---	---	\$434,700,000	\$4,500,000	\$4,200,000	\$511,100,000	\$102,220,000	\$613,320,000
C2A	4,517,391	240,778	\$76,000,000	---	---	---	\$6,500,000	---	---	\$47,500,000	\$4,500,000	\$4,200,000	\$138,700,000	\$27,740,000	\$166,440,000
C2B	4,517,391	240,778	\$76,000,000	---	---	\$19,900,000	\$6,300,000	---	---	\$277,100,000	\$4,500,000	\$4,200,000	\$388,000,000	\$77,600,000	\$465,600,000
C3	4,517,391	240,778	\$57,200,000	---	---	\$143,200,000	\$5,200,000	---	---	\$182,900,000	\$4,500,000	\$4,200,000	\$397,200,000	\$79,440,000	\$476,640,000
D	4,517,391	240,778	---	\$67,200,000	---	---	\$1,000,000	---	\$39,200,000	\$244,600,000	\$4,500,000	\$4,200,000	\$360,700,000	\$72,140,000	\$432,840,000
E	4,517,391	240,778	\$76,000,000	---	---	\$19,900,000	\$11,900,000	\$166,800,000	---	---	\$4,500,000	\$4,200,000	\$283,300,000	\$56,660,000	\$339,960,000
F	3,102,041	240,778	---	\$47,100,000	\$42,900,000	---	\$1,000,000	---	\$39,200,000	\$95,500,000	\$4,500,000	\$4,200,000	\$234,400,000	\$46,880,000	\$281,280,000

¹Bayport closure costs are present value costs based on closure 40 years from the present.

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
DE PERE TO GREEN BAY
Action Level - 125 ppb

Material Handling Assumptions:

Volume > 125 ppb	6,868,500	cy	1130	ac	5,243,130	m3	Acres corresponds to dredge footprint area
Volume > 250 ppb	6,449,065	cy			4,922,950	m3	
Volume > 500 ppb	6,169,458	cy			4,709,510	m3	
Volume > 1,000 ppb	5,879,529	cy			4,488,190	m3	
Volume > 5000 ppb	4,517,391	cy			3,448,390	m3	
Volume > 50,000 ppb	240,778	cy			183,800	m3	
Solids Specific Gravity	2.36						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Slurry Density (20% in situ)	8.0%	w/w	3.6%	v/v	0.88	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	15.4%	v/v	1.02	tons per cy	Montgomery Watson
Dewatered Density (Hydraulic Dredging and CDF)	50.0%	w/w	29.8%	v/v	1.18	tons per cy	Foth & VanDyke
Dewatered Density (Mechanical Dredging)	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Treated Density	93.4%	w/w	60.0%	v/v	1.28	tons per cy	
CDF Capacity	2,136,771	cy	in situ		974,801	m3	
HTTD Treatment Capacity	1,577,177	cy	in situ		1,650,000	tons	
Cap Volume	2,187,936	cy			1,670,180	m3	
Vitrification Treatment Capacity	9,106,166	cy	in situ		6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%		
Sales Tax	5.5%		
Engineering, Procurement and Construction Mgmt	12.0%		Not Used
Contractor Overhead and Profit - Dredging Only	15.0%		

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day		
Sediment Removal QA	\$1,200	per day		
Debris Sweep	\$16,000	per acre		Ogden Beeman
Hydraulic - 2 12-inch Cutterheads				
Site Preparation	\$803,400	LS		Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS		Ogden Beeman
Mobilization - Silt Curtain	\$35,000			Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift		Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift		Ogden Beeman
Winter Over Equipment	\$285,000	per year		Ogden Beeman
Site Restoration	\$600,000	per dredge launch site		
Length of Piping	95,000	ft	18	mi
				Distance to Town of Holland (map provided by Fred Swed). 11 mi of hard piping plus 7 mi of floating pipe
Piping Purchase/Installation	\$67	per ft		Ogden Beeman
Number of Road Crossings	12	each		pj, review map
Cost per Road Crossing	\$50,000	per crossing		pj, review map
Number of Booster Pumps	4	each		Ogden Beeman
Booster Pump Cost	\$2,500	per day		Ogden Beeman
Mechanical - 8 cy bucket				
Dock Construction	\$400,000	LS		pj
Mobilization - Equipment	\$455,000	per dredge		Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS		Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea		Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$17,000	per shift		Ogden Beeman
Dredge Rate	1900	cy in situ per 10 hour shift		Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area		pj
Free Water per cy Dredged (10%)	20	gal		Ogden Beeman
Offload Crane Mobilization	\$50,000	LS		pj
Site Restoration	\$500,000	LS		pj
High Temperature Thermal Desorption				
Setup Staging Area	\$50,000			pj
Mobilization/Site Prep	\$150,000			Maxymillian
Sediment Treatment QA	\$2	per ton		
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1		
Sand Purchase and Deliver	\$6	per ton		Ole
Blending	\$25	per ton		Ole
HTTD (includes off-gas treatment)	\$75	per ton		Maxymillian
Stack Testing	\$50,000	LS		Maxymillian
Place Treated Material	\$3	per ton		
Vitrification				
Capital Costs	\$36,000,000	LS		Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year		Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton		Unit Cost Study- Minergy

Capping					
Mobilization/Site Prep	\$200,000				Ogden Beeman
Area	21,055,849	sf	1,956,200	m2	
Sand Cap Depth	1.7	feet			
Sand Purchase	\$6	per ton			Ole
Placement Rate	\$6	per cy			Ogden Beeman
Sand Density	1.4	tons per cy			
Armored Cap Depth	1.0	feet			
Cobbles	\$30	per cy			Means
Sand Density	1.4	tons per cy			
Cap Placement QA	\$100,000	LS			Ogden Beeman
Long-term O&M	2%	of capital			pj
Long-term Monitoring	\$400,000	per year			Anne LTM
Nearshore CDF					
			<u>Bayport</u>		
Land Lease or Purchase	\$1.80	per sf			Baird
Length	9,600	lf			Baird
Capping Volume	205,000	cy	2,178,000		Baird
Seeding Area	300,000	sy	2,178,000		Baird
Sheetpile Wall Length	9,600	lf			based on bathymetry
Sheetpile Depth	30	ft			pj
Sheetpile Cost	\$19	per sf			Baird
Shot Rock Berm	\$500	per lf			Baird
Rip Rap	\$210	per lf			pj
Clean Soil Cap	\$10	per cy			Baird
Seeding	\$1	per sy			Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10.0%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	4,491,228	sf	103.10		2 days slurry + 13 wk solids * 2 cells * 2 shifts per day
Perimeter	8,477	lf	2119.251741		assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Water Treatment					
Flow Rate (3 Mechanical Dredges)	57	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges)	\$216,590	LS			pj
Flow Rate (3 Mechanical Dredges to CDF)	287	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges to CDF)	\$570,498	LS			pj
Flow Rate (2 Hydraulic Dredges)	3,563	gpm			assume operate 24/7
Unit, Purchase (Hydraulic Dredge)	\$2,586,470	LS			pj
Flow Rate (2 Hydraulic Dredges; settling pond)	3,110	gpm			assume operate 24/7
Flow Rate (mechanical dewatering)	3,563	gpm			
Unit, Purchase (mechanical dewatering)	\$2,586,470	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Length of piping for treated water discharge	20,000	feet			Distance from town of Holland to river per map provided by Fred Swed
Disposal					
Existing NR 500 Commercial Disposal Facility					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Conveyer System Construction	1,000,000	LS			pj
New Landfill Disposal (Dedicated NR 500 Monofill)					
Landfill Construction	\$25,988,920				
Local Siting Fee	\$5	per cy			
Closure Cap	\$100,000	per acre			
Operating Cost	\$500,000	per year			
Post-closure Monitoring	\$30,000	per year			

Institutional Controls

Public Education Program	\$100,000	pj
O&M Plans	\$20,000	pj
Deed Restrictions	\$5,000	pj
<u>Annual Costs</u>		
Public Education Program	\$30,000	pj
Maintaining O&M Plans	\$800	pj
Reporting	\$20,000	pj
Long-term Monitoring	\$600,000	Anne LTM
Long-term Monitoring (no action)	\$300,000	Anne LTM

ALTERNATIVE A: No Action

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery

MONITORING/INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000
TOTAL COST			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	3,615	Day	27.80769231 \$61,455,000
Dredge Monitoring (Water Quality)	3,615	Day	\$10,845,000
Sediment Removal QA	3,615	Day	\$4,338,000
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$79,133,000
Engineering, Procurement & Construction Management:			9,495,960
Contractor Overhead/Profit:			11,869,950
Total Capital:			\$100,500,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	57	gpm	\$216,590
Water Treatment (Includes Operator)	138,716,232	gal	\$55,486
Water Treatment QA	1,687	day	\$337,400
Direct Capital:			\$609,476
Engineering, Procurement & Construction Management:			73,137
Total Capital:			\$700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	7,185,641	ton	\$179,641,037
Lime Purchase	718,565	ton	\$43,113,900
Soil Loading	7,185,641	ton	\$20,119,796
Soil Hauling	7,185,641	ton	\$33,682,694
Tipping Fees (non-TSCA)	6,933,746	ton	\$298,151,076
Tipping Fees (TSCA)	251,896	ton	\$13,854,253
Direct Capital:			\$588,562,756
Engineering, Procurement & Construction Management:			70,627,531
Total Capital:			\$659,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$769,100,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units		Cost
Site Preparation	2	LS		\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	1130	acre		\$18,080,000
Dredging - 2 12 hour shifts/day	1191	Day	6.543956044	\$33,824,400
Dredge Monitoring (Water Quality)	1191	Day		\$7,146,000
Sediment Removal QA	1191	Day		\$2,858,400
Piping	95,000	ft		\$6,365,000
Road Crossings	12	ea		\$600,000
Booster Pumps	4	ea		\$11,910,000
Winter Over All Equipment	7	yr		\$1,995,000
Site Restoration	1	LS		\$600,000
Direct Capital:				\$86,155,600
Engineering, Procurement & Construction Management:				10,338,672
Contractor Overhead/Profit:				12,923,340
Total Capital:				\$109,400,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	3,563	gpm		\$2,586,470
Water Treatment (Including Operator)	6,106,807,801	gal		\$2,442,723
Water Treatment QA	1,191	Day		\$476,400
Piping	20,000	ft		\$1,340,000
Direct Capital:				\$6,845,593
Engineering, Procurement & Construction Management:				821,471
Total Capital:				\$7,700,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units		Cost
Landfill Construction	1	LS		\$25,988,920
Local Siting Fee	4,104,792	cy		\$20,523,960
Closure	127	acres		\$12,721,463
Direct Capital:				\$59,234,343
Engineering, Procurement & Construction Management:				7,108,121
Total Capital:				\$66,300,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost		
Operations	10	\$500,000		\$3,680,044
Post Closure Monitoring	40	\$30,000		\$252,053
Total Present Worth, Longer Term O&M Costs				\$3,932,097
Total Project Capital and O&M Cost				\$70,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units		Cost
Deed Restrictions	1	LS		\$5,000
Direct Capital:				\$5,000
Engineering, Procurement & Construction Management:				600
Total Capital:				\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost		
Long-term Monitoring (no action)	40	\$300,000		\$4,513,889
Total Present Worth, Longer Term O&M Costs				\$4,513,889
Total Project Capital and O&M Cost				\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$192,100,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facilities

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1130	acre	\$18,080,000
Dredging - 2 12 hour shifts/day	1191	Day	\$33,824,400
Dredge Monitoring (Water Quality)	1191	Day	\$7,146,000
Sediment Removal QA	1191	Day	\$2,858,400
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$11,910,000
Winter Over All Equipment	7	yr	\$1,995,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$86,155,600
Engineering, Procurement & Construction Management:			10,338,672
Contractor Overhead/Profit:			12,923,340
Total Capital:			\$109,400,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	5,330,439,162	gal	\$2,132,176
Water Treatment QA	1,191	Day	\$476,400
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$6,535,045
Engineering, Procurement & Construction Management:			784,205
Total Capital:			\$7,300,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	8,095,823	ton	\$202,395,568
Lime Purchase	809,583	ton	\$48,574,980
Sediment Loading	8,095,823	ton	\$22,668,304
Sediment Hauling	8,095,823	ton	\$37,949,169
Landfill Construction	1	LS	\$25,988,920
Local Siting Fee	4,104,792	cy	\$20,523,960
Closure	127	acres	\$12,721,463
Direct Capital:			\$370,822,364
Engineering, Procurement & Construction Management:			44,498,684
Total Capital:			\$415,300,000
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$252,053
Total Present Worth, Longer Term O&M Costs			\$3,932,097
Total Project Capital and O&M Cost			\$419,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$564,500,000

ALTERNATIVE C3: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)

SEDIMENT REMOVAL (2 - 12-inch CUTTERHEADS)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1130	acre	\$18,080,000
Dredging - 2 12 hour shifts/day	1191	Day	6.543956044 \$33,824,400
Dredge Monitoring (Water Quality)	1191	Day	\$7,146,000
Sediment Removal QA	1191	Day	\$2,858,400
Winter Over All Equipment	7	yr	\$1,995,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$67,280,600
Engineering, Procurement & Construction Management:			8,073,672
Contractor Overhead/Profit:			10,092,090
Total Capital:			\$85,400,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	2,428,747	bd	\$194,299,745
Direct Capital:			\$194,399,745
Engineering, Procurement & Construction Management:			23,327,969
Total Capital:			\$217,700,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,563	gpm	\$2,586,470
Water Treatment (Includes Operator)	6,106,807,801	gal	\$2,442,723
Water Treatment QA	3,334	day	\$666,800
Direct Capital:			\$5,695,993
Engineering, Procurement & Construction Management:			683,519
Total Capital:			\$6,400,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	4,857,494	ton	\$13,600,982
Soil Hauling	4,857,494	ton	\$22,769,501
Tipping Fees (non-TSCA)	4,687,212	ton	\$201,550,127
Tipping Fees (TSCA)	170,281	ton	\$9,365,475
Direct Capital:			\$247,286,086
Engineering, Procurement & Construction Management:			29,674,330
Total Capital:			\$277,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000

Present Worth of Direct Capital:	\$2,766,749
Engineering, Procurement & Construction Management:	\$332,010

Total Capital:	\$3,098,759
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Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659

Total Present Worth, Longer Term O&M Costs	\$1,056,130
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Total Project Capital and O&M Cost	\$4,200,000
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TOTAL COST	\$595,200,000
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ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	3,615	Day	\$61,455,000
Dredge Monitoring (Water Quality)	3,615	Day	\$10,845,000
Sediment Removal QA	3,615	Day	\$4,338,000
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000

Direct Capital:	\$79,133,000
Engineering, Procurement & Construction Management:	9,495,960
Contractor Overhead/Profit:	11,869,950

Total Capital:	\$100,500,000
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CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835

Direct Capital:	\$20,117,835
Engineering, Procurement & Construction Management:	\$2,414,140

Total Capital:	\$22,531,975
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Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456

Total Present Worth, Longer Term O&M Costs	\$16,711,012
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Total Project Capital and O&M Cost	\$39,200,000
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WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	312,357,784	gal	\$124,943
Water Treatment QA	1,687	day	\$337,400

Direct Capital:	\$1,032,841
Engineering, Procurement & Construction Management:	123,941

Total Capital:	\$1,200,000
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SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	4,950,209	ton	\$123,755,225
Lime Purchase	495,021	ton	\$29,701,260
Soil Loading	4,950,209	ton	\$13,860,585
Soil Hauling	4,950,209	ton	\$23,204,105
Tipping Fees (non-TSCA)	4,698,313	ton	\$202,027,479
Tipping Fees (TSCA)	365,647	ton	\$20,110,606
Direct Capital:			\$412,659,260
Engineering, Procurement & Construction Management:			49,519,111
Total Capital:			\$462,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$611,800,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment

SEDIMENT REMOVAL (2 - 12-inch CUTTERHEAD'S)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1130	acre	\$18,080,000
Dredging - 2 12 hour shifts/day	1191	Day	\$33,824,400
Dredge Monitoring (Water Quality)	1191	Day	\$7,146,000
Sediment Removal QA	1191	Day	\$2,858,400
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$11,910,000
Winter Over All Equipment	7	yr	\$1,995,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$86,155,600
Engineering, Procurement & Construction Management:			10,338,672
Contractor Overhead/Profit:			12,923,340
Total Capital:			\$109,400,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	5,330,439,162	gal	\$2,132,176
Water Treatment QA	1,191	Day	\$476,400
Piping	95,000	ft	\$6,365,000
Direct Capital:			\$11,560,045
Engineering, Procurement & Construction Management:			1,387,205
Total Capital:			\$12,900,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units	Cost
Sediment Treatment	8,095,823	ton	\$194,299,745
Soil Loading	8,095,823	ton	\$22,668,304
Soil Hauling	8,095,823	ton	\$9,487,292
Direct Capital:			\$226,455,341
Engineering, Procurement & Construction Management:			\$27,174,641
Total Capital:			\$253,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$404,500,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible,Dredge to CDF and Off-site Disposal

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835
Direct Capital:			\$20,117,835
Engineering, Procurement & Construction Management:			\$2,414,140
Total Capital:			\$22,531,975
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456
Total Present Worth, Longer Term O&M Costs			\$16,711,012
Total Project Capital and O&M Cost			\$39,200,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	1,819,641	tons	\$10,917,848
Sand Placement	1,299,744	cy	\$7,798,463
Cobble Purchase and Placement	779,846	cy	\$23,395,388
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$42,411,699
Engineering, Procurement & Construction Management:			5,089,404
Total Capital:			\$47,501,103
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$950,022	\$14,294,314
Total Present Worth, Longer Term O&M Costs			\$20,312,833
Total Project Capital and O&M Cost			\$67,800,000

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	2,464	Day	\$41,888,000
Dredge Monitoring (Water Quality)	2,464	Day	\$7,392,000
Sediment Removal QA	2,464	Day	\$2,956,800
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$54,731,800
Engineering, Procurement & Construction Management:			6,567,816
Contractor Overhead/Profit:			8,209,770
Total Capital:			\$69,500,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	268,170,233	gal	\$107,268
Water Treatment QA	1,687	day	\$337,400
Direct Capital:			\$1,015,166
Engineering, Procurement & Construction Management:			121,820
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	2,661,249	ton	\$66,531,225
Lime Purchase	266,125	ton	\$15,967,500
Soil Loading	2,661,249	ton	\$7,451,497
Soil Hauling	2,661,249	ton	\$12,474,605
Tipping Fees (non-TSCA)	2,409,353	ton	\$103,602,198
Tipping Fees (TSCA)	251,896	ton	\$13,854,255
Direct Capital:			\$219,881,280
Engineering, Procurement & Construction Management:			26,385,754
Total Capital:			\$246,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$432,600,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
DE PERE TO GREEN BAY
Action Level - 250 ppb

Material Handling Assumptions:

Volume > 250 ppb	6,449,065	cy	1103	ac	4,922,950	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	6,868,500	cy			5,243,130	m3	
Volume > 500 ppb	6,169,458	cy			4,709,510	m3	
Volume > 1,000 ppb	5,879,529	cy			4,488,190	m3	
Volume > 5000 ppb	4,517,391	cy			3,448,390	m3	
Volume > 50,000 ppb	240,778	cy			183,800	m3	
Solids Specific Gravity	2.36						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Slurry Density (20% in situ)	8.0%	w/w	3.6%	v/v	0.88	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	15.4%	v/v	1.02	tons per cy	Montgomery Watson
Dewatered Density (Hydraulic Dredging and CDF)	50.0%	w/w	29.8%	v/v	1.18	tons per cy	Foth & VanDyke
Dewatered Density (Mechanical Dredging)	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Treated Density	93.4%	w/w	60.0%	v/v	1.28	tons per cy	
CDF Capacity	2,136,771	cy		in situ	974,801	m3	
HTTD Treatment Capacity	1,577,177	cy		in situ	1,650,000	tons	
Cap Volume	2,015,618	cy			1,538,640	m3	
Vitrification Treatment Capacity	9,106,166	cy		in situ	6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%					
Sales Tax	5.5%					Not Used
Engineering, Procurement and Construction Mgmt	12.0%					
Contractor Overhead and Profit - Dredging Only	15.0%					

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day				
Sediment Removal QA	\$1,200	per day				
Debris Sweep	\$16,000	per acre				Ogden Beeman
Hydraulic - 2 12-inch Cutterheads						
Site Preparation	\$803,400	LS				Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS				Ogden Beeman
Mobilization - Silt Curtain	\$35,000					Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift				Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift				Ogden Beeman
Winter Over Equipment	\$285,000	per year				Ogden Beeman
Site Restoration	\$600,000	per dredge launch site				
Length of Piping	95,000	ft		18	mi	Distance to Town of Holland (map provided by Fred Swed). 11 mi of hard piping plus 7 mi of floating pipe
Piping Purchase/Installation	\$67	per ft				Ogden Beeman
Number of Road Crossings	12	each				pj, review map
Cost per Road Crossing	\$50,000	per crossing				pj, review map
Number of Booster Pumps	4	each				Ogden Beeman
Booster Pump Cost	\$2,500	per day				Ogden Beeman
Mechanical - 8 cy bucket						
Dock Construction	\$400,000	LS				pj
Mobilization - Equipment	\$455,000	per dredge				Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS				Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea				Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$17,000	per shift				Ogden Beeman
Dredge Rate	1900	cy in situ per 10 hour shift				Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area				pj
Free Water per cy Dredged (10%)	20	gal				Ogden Beeman
Offload Crane Mobilization	\$50,000	LS				pj
Site Restoration	\$500,000	LS				pj
High Temperature Thermal Desorption						
Setup Staging Area	\$50,000					pj
Mobilization/Site Prep	\$150,000					Maxymillian
Sediment Treatment QA	\$2	per ton				
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1				
Sand Purchase and Deliver	\$6	per ton				Ole
Blending	\$25	per ton				Ole
HTTD (includes off-gas treatment)	\$75	per ton				Maxymillian
Stack Testing	\$50,000	LS				Maxymillian
Place Treated Material	\$3	per ton				
Vitrification						
Capital Costs	\$36,000,000	LS				Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year				Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton				Unit Cost Study- Minergy
Capping						
Mobilization/Site Prep	\$200,000					Ogden Beeman
Area	20,514,438	sf	1,905,900		m2	
Sand Cap Depth	1.7	feet				
Sand Purchase	\$6	per ton				Ole
Placement Rate	\$6	per cy				Ogden Beeman
Sand Density	1.4	tons per cy				
Armored Cap Depth	1.0	feet				
Cobbles	\$30	per cy				Means
Sand Density	1.4	tons per cy				
Cap Placement QA	\$100,000	LS				Ogden Beeman
Long-term O&M	2%	of capital				pj
Long-term Monitoring	\$400,000	per year				Anne LTM

<u>Nearshore CDF</u>			<u>Bayport</u>		
Land Lease or Purchase	\$1.80	per sf			Baird
Length	9,600	lf			Baird
Capping Volume	205,000	cy		2,178,000	Baird
Seeding Area	300,000	sy		2,178,000	Baird
Sheetpile Wall Length	9,600	lf			based on bathymetry
Sheetpile Depth	30	ft			pj
Sheetpile Cost	\$19	per sf			Baird
Shot Rock Berm	\$500	per lf			Baird
Rip Rap	\$210	per lf			pj
Clean Soil Cap	\$10	per cy			Baird
Seeding	\$1	per sy			Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
<u>Solidification</u>					
Percent Lime	10.0%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
<u>Dewatering - Mechanical</u>					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
<u>Dewatering - Upland Pond (2 cells)</u>					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	4,491,228	sf		103.10	2 days slurry + 13 wk solids * 2 cells * 2 shifts per day
Perimeter	8,477	lf		2119.251741	assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
<u>Water Treatment</u>					
Flow Rate (3 Mechanical Dredges)	57	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges)	\$216,590	LS			pj
Flow Rate (3 Mechanical Dredges to CDF)	287	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges to CDF)	\$570,498	LS			pj
Flow Rate (2 Hydraulic Dredges)	3,563	gpm			assume operate 24/7
Unit, Purchase (Hydraulic Dredge)	\$2,586,470	LS			pj
Flow Rate (2 Hydraulic Dredges; settling pond)	3,110	gpm			assume operate 24/7
Flow Rate (mechanical dewatering)	3,563	gpm			
Unit, Purchase (mechanical dewatering)	\$2,586,470	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Length of piping for treated water discharge	20,000	feet			
<u>Disposal</u>					
Existing NR 500 Commercial Disposal Facility					Distance from town of Holland to river
Load Soil for Hauling	\$2.80	per ton			per map provided by Fred Swed
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vitrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Conveyer System Construction	1,000,000	LS			pj
<u>New Landfill Disposal (Dedicated NR 500 Monofill)</u>					
Landfill Construction	\$24,401,866				
Local Siting Fee	\$5	per cy			
Closure Cap	\$100,000	per acre			
Operating Cost	\$500,000	per year			
Post-closure Monitoring	\$30,000	per year			
<u>Institutional Controls</u>					
Public Education Program	\$100,000				pj
O&M Plans	\$20,000				pj
Deed Restrictions	\$5,000				pj
<u>Annual Costs</u>					
Public Education Program	\$30,000				pj
Maintaining O&M Plans	\$800				pj
Reporting	\$20,000				pj
Long-term Monitoring	\$600,000				Anne LTM
Long-term Monitoring (no action)	\$300,000				Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000
TOTAL COST			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	3,395	Day	\$57,715,000
Dredge Monitoring (Water Quality)	3,395	Day	\$10,185,000
Sediment Removal QA	3,395	Day	\$4,074,000
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$74,469,000
Engineering, Procurement & Construction Management:			8,936,280
Contractor Overhead/Profit:			11,170,350
Total Capital:			\$94,600,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	57	gpm	\$216,590
Water Treatment (Includes Operator)	130,245,307	gal	\$52,098
Water Treatment QA	1,584	day	\$316,800
Direct Capital:			\$585,488
Engineering, Procurement & Construction Management:			70,259
Total Capital:			\$700,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost	
Solidification	6,746,839	ton	\$168,670,973	
Lime Purchase	674,684	ton	\$40,481,040	
Soil Loading	6,746,839	ton	\$18,891,149	
Soil Hauling	6,746,839	ton	\$31,625,808	
Tipping Fees (non-TSCA)	6,494,943	ton	\$279,282,567	\$293,136,820
Tipping Fees (TSCA)	251,896	ton	\$13,854,253	
Direct Capital:			\$552,805,790	
Engineering, Procurement & Construction Management:			66,336,695	
Total Capital:			\$619,100,000	

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$723,100,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1103	acre	\$17,648,000
Dredging - 2 12 hour shifts/day	1118	Day	\$31,751,200
Dredge Monitoring (Water Quality)	1118	Day	\$6,708,000
Sediment Removal QA	1118	Day	\$2,683,200
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$11,180,000
Winter Over All Equipment	7	yr	\$1,995,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$82,307,200
Engineering, Procurement & Construction Management:			9,876,864
Contractor Overhead/Profit:			12,346,080
Total Capital:			\$104,500,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,563	gpm	\$2,586,470
Water Treatment (Including Operator)	5,733,885,955	gal	\$2,293,554
Water Treatment QA	1,118	Day	\$447,200
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$6,667,224
Engineering, Procurement & Construction Management:			800,067
Total Capital:			\$7,500,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Landfill Construction	1	LS	\$24,401,866
Local Siting Fee	3,854,126	cy	\$19,270,632
Closure	119	acres	\$11,944,607
Direct Capital:			\$55,617,105
Engineering, Procurement & Construction Management:			6,674,053
Total Capital:			\$62,300,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$252,053
Total Present Worth, Longer Term O&M Costs			\$3,932,097
Total Project Capital and O&M Cost			\$66,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$183,000,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facilities

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1103	acre	\$17,648,000
Dredging - 2 12 hour shifts/day	1118	Day	\$31,751,200
Dredge Monitoring (Water Quality)	1118	Day	\$6,708,000
Sediment Removal QA	1118	Day	\$2,683,200
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$11,180,000
Winter Over All Equipment	7	yr	\$1,995,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$82,307,200
Engineering, Procurement & Construction Management:			9,876,864
Contractor Overhead/Profit:			12,346,080
Total Capital:			\$104,500,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	5,004,927,490	gal	\$2,001,971
Water Treatment QA	1,118	Day	\$447,200
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$6,375,641
Engineering, Procurement & Construction Management:			765,077
Total Capital:			\$7,100,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	7,601,439	ton	\$190,035,963
Lime Purchase	760,144	ton	\$45,608,640
Sediment Loading	7,601,439	ton	\$21,284,028
Sediment Hauling	7,601,439	ton	\$35,631,743
Landfill Construction	1	LS	\$24,401,866
Local Siting Fee	3,854,126	cy	\$19,270,632
Closure	119	acres	\$11,944,607
Direct Capital:			\$348,177,479
Engineering, Procurement & Construction Management:			41,781,297
Total Capital:			\$390,000,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$252,053
Total Present Worth, Longer Term O&M Costs			\$3,932,097
Total Project Capital and O&M Cost			\$393,900,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$534,100,000

ALTERNATIVE C3: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)

SEDIMENT REMOVAL (2 - 12-inch CUTTERHEADS)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1103	acre	\$17,648,000
Dredging - 2 12 hour shifts/day	1118	Day	6.142857143 \$31,751,200
Dredge Monitoring (Water Quality)	1118	Day	\$6,708,000
Sediment Removal QA	1118	Day	\$2,683,200
Winter Over All Equipment	7	yr	\$1,995,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$64,162,200
Engineering, Procurement & Construction Management:			7,699,464
Contractor Overhead/Profit:			9,624,330
Total Capital:			\$81,500,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$100,000
Dewatering	2,280,432	bd	\$182,434,525
Direct Capital:			\$182,534,525
Engineering, Procurement & Construction Management:			21,904,143
Total Capital:			\$204,400,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,563	gpm	\$2,586,470
Water Treatment (Includes Operator)	5,733,885,955	gal	\$2,293,554
Water Treatment QA	3,130	day	\$626,000
Direct Capital:			\$5,506,024
Engineering, Procurement & Construction Management:			660,723
Total Capital:			\$6,200,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Soil Loading	4,560,863	ton	\$12,770,417
Soil Hauling	4,560,863	ton	\$21,379,046
Tipping Fees (non-TSCA)	4,390,582	ton	\$188,795,016
Tipping Fees (TSCA)	170,281	ton	\$9,365,475
Direct Capital:			\$232,309,953
Engineering, Procurement & Construction Management:			27,877,194
Total Capital:			\$260,200,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$561,000,000

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	3,395	Day	\$57,715,000
Dredge Monitoring (Water Quality)	3,395	Day	\$10,185,000
Sediment Removal QA	3,395	Day	\$4,074,000
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$74,469,000
Engineering, Procurement & Construction Management:			8,936,280
Contractor Overhead/Profit:			11,170,350
Total Capital:			\$94,600,000

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835
Direct Capital:			\$20,117,835
Engineering, Procurement & Construction Management:			\$2,414,140
Total Capital:			\$22,531,975

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456
Total Present Worth, Longer Term O&M Costs			\$16,711,012
Total Project Capital and O&M Cost			\$39,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	303,886,859	gal	\$121,555
Water Treatment QA	1,584	day	\$316,800
Direct Capital:			\$1,008,853
Engineering, Procurement & Construction Management:			121,062
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	4,511,406	ton	\$112,785,150
Lime Purchase	451,141	ton	\$27,068,460
Soil Loading	4,511,406	ton	\$12,631,937
Soil Hauling	4,511,406	ton	\$21,147,216
Tipping Fees (non-TSCA)	4,259,510	ton	\$183,158,951
Tipping Fees (TSCA)	376,711	ton	\$20,719,131
Direct Capital:			\$377,510,845
Engineering, Procurement & Construction Management:			45,301,301
Total Capital:			\$422,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$566,400,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment

SEDIMENT REMOVAL (2 - 12-inch CUTTERHEAD'S)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1103	acre	\$17,648,000
Dredging - 2 12 hour shifts/day	1118	Day	6.142857143 \$31,751,200
Dredge Monitoring (Water Quality)	1118	Day	\$6,708,000
Sediment Removal QA	1118	Day	\$2,683,200
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$11,180,000
Winter Over All Equipment	7	yr	\$1,995,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$82,307,200
Engineering, Procurement & Construction Management:			9,876,864
Contractor Overhead/Profit:			12,346,080
Total Capital:			\$104,500,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	5,004,927,490	gal	\$2,001,971
Water Treatment QA	1,118	Day	\$447,200
Piping	95,000	ft	\$6,365,000
Direct Capital:			\$11,400,641
Engineering, Procurement & Construction Management:			1,368,077
Total Capital:			\$12,800,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units	Cost
Sediment Treatment	7,601,439	ton	\$182,434,525
Soil Loading	7,601,439	ton	\$21,284,028
Soil Hauling	7,601,439	ton	\$8,907,936
Direct Capital:			\$212,626,488
Engineering, Procurement & Construction Management:			\$25,515,179
Total Capital:			\$238,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$384,000,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible,Dredge to CDF and Off-site Disposal

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835
Direct Capital:			\$20,117,835
Engineering, Procurement & Construction Management:			\$2,414,140
Total Capital:			\$22,531,975
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456
Total Present Worth, Longer Term O&M Costs			\$16,711,012
Total Project Capital and O&M Cost			\$39,200,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	1,772,853	tons	\$10,637,116
Sand Placement	1,266,323	cy	\$7,597,940
Cobble Purchase and Placement	759,794	cy	\$22,793,820
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$41,328,876
Engineering, Procurement & Construction Management:			4,959,465
Total Capital:			\$46,288,341
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$925,767	\$13,929,362
Total Present Worth, Longer Term O&M Costs			\$19,947,881
Total Project Capital and O&M Cost			\$66,200,000

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	2,334	Day	\$39,678,000
Dredge Monitoring (Water Quality)	2,334	Day	\$7,002,000
Sediment Removal QA	2,334	Day	\$2,800,800
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$51,975,800
Engineering, Procurement & Construction Management:			6,237,096
Contractor Overhead/Profit:			7,796,370
Total Capital:			\$66,000,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	263,179,430	gal	\$105,272
Water Treatment QA	1,584	day	\$316,800
Direct Capital:			\$992,570
Engineering, Procurement & Construction Management:			119,108
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	2,402,720	ton	\$60,068,000
Lime Purchase	240,272	ton	\$14,416,320
Soil Loading	2,402,720	ton	\$6,727,616
Soil Hauling	2,402,720	ton	\$11,262,750
Tipping Fees (non-TSCA)	2,150,824	ton	\$92,485,453
Tipping Fees (TSCA)	251,896	ton	\$13,854,254
Direct Capital:			\$198,814,392
Engineering, Procurement & Construction Management:			23,857,727
Total Capital:			\$222,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$403,900,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
DE PERE TO GREEN BAY
Action Level - 500 ppb

Material Handling Assumptions:

Volume > 500 ppb	6,169,458	cy	1083	ac	4,709,510	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	6,868,500	cy			5,243,130	m3	
Volume > 250 ppb	6,449,065	cy			4,922,950	m3	
Volume > 1,000 ppb	5,879,529	cy			4,488,190	m3	
Volume > 5000 ppb	4,517,391	cy			3,448,390	m3	
Volume > 50,000 ppb	240,778	cy			183,800	m3	
Solids Specific Gravity	2.36						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Slurry Density (20% in situ)	8.0%	w/w	3.6%	v/v	0.88	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	15.4%	v/v	1.02	tons per cy	Montgomery Watson
Dewatered Density (Hydraulic Dredging and CDF)	50.0%	w/w	29.8%	v/v	1.18	tons per cy	Foth & VanDyke
Dewatered Density (Mechanical Dredging)	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Treated Density	93.4%	w/w	60.0%	v/v	1.28	tons per cy	
CDF Capacity	2,136,771	cy	in situ		974,801	m3	
HTTD Treatment Capacity	1,577,177	cy	in situ		1,650,000	tons	
Cap Volume	1,926,748	cy			1,470,800	m3	
Vitrification Treatment Capacity	9,106,166	cy	in situ		6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%		
Sales Tax	5.5%		
Engineering, Procurement and Construction Mgmt	12.0%		Not Used
Contractor Overhead and Profit - Dredging Only	15.0%		

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day		
Sediment Removal QA	\$1,200	per day		
Debris Sweep	\$16,000	per acre		Ogden Beeman
Hydraulic - 2 12-inch Cutterheads				
Site Preparation	\$803,400	LS		Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS		Ogden Beeman
Mobilization - Silt Curtain	\$35,000			Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift		Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift		Ogden Beeman
Winter Over Equipment	\$285,000	per year		Ogden Beeman
Site Restoration	\$600,000	per dredge launch site		Ogden Beeman
Length of Piping	95,000	ft	18	mi
				Distance to Town of Holland (map provided by Fred Swed). 11 mi of hard piping plus 7 mi of floating pipe
Piping Purchase/Installation	\$67	per ft		Ogden Beeman
Number of Road Crossings	12	each		pj, review map
Cost per Road Crossing	\$50,000	per crossing		pj, review map
Number of Booster Pumps	4	each		Ogden Beeman
Booster Pump Cost	\$2,500	per day		Ogden Beeman
Mechanical - 8 cy bucket				
Dock Construction	\$400,000	LS		pj
Mobilization - Equipment	\$455,000	per dredge		Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS		Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea		Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$17,000	per shift		Ogden Beeman
Dredge Rate	1900	cy in situ per 10 hour shift		Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area		pj
Free Water per cy Dredged (10%)	20	gal		Ogden Beeman
Offload Crane Mobilization	\$50,000	LS		pj
Site Restoration	\$500,000	LS		pj
High Temperature Thermal Desorption				
Setup Staging Area	\$50,000			pj
Mobilization/Site Prep	\$150,000			Maxymillian
Sediment Treatment QA	\$2	per ton		
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1		
Sand Purchase and Deliver	\$6	per ton		Ole
Blending	\$25	per ton		Ole
HTTD (includes off-gas treatment)	\$75	per ton		Maxymillian
Stack Testing	\$50,000	LS		Maxymillian
Place Treated Material	\$3	per ton		
Vitrification				
Capital Costs	\$36,000,000	LS		Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year		Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton		Unit Cost Study- Minergy

Capping					
Mobilization/Site Prep	\$200,000				Ogden Beeman
Area	20,132,328	sf	1,870,400	m2	
Sand Cap Depth	1.7	feet			
Sand Purchase	\$6	per ton			Ole
Placement Rate	\$6	per cy			Ogden Beeman
Sand Density	1.4	tons per cy			
Armored Cap Depth	1.0	feet			
Cobbles	\$30	per cy			Means
Sand Density	1.4	tons per cy			
Cap Placement QA	\$100,000	LS			Ogden Beeman
Long-term O&M	2%	of capital			pj
Long-term Monitoring	\$400,000	per year			Anne LTM
Nearshore CDF					
			<u>Bayport</u>		
Land Lease or Purchase	\$1.80	per sf			Baird
Length	9,600	lf			Baird
Capping Volume	205,000	cy	2,178,000		Baird
Seeding Area	300,000	sy	2,178,000		Baird
Sheetpile Wall Length	9,600	lf			based on bathymetry
Sheetpile Depth	30	ft			pj
Sheetpile Cost	\$19	per sf			Baird
Shot Rock Berm	\$500	per lf			Baird
Rip Rap	\$210	per lf			pj
Clean Soil Cap	\$10	per cy			Baird
Seeding	\$1	per sy			Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10.0%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	4,491,228	sf	103.10		2 days slurry + 13 wk solids * 2 cells * 2 shifts per day
Perimeter	8,477	lf	2119.251741		assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Water Treatment					
Flow Rate (3 Mechanical Dredges)	57	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges)	\$216,590	LS			pj
Flow Rate (3 Mechanical Dredges to CDF)	287	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges to CDF)	\$570,498	LS			pj
Flow Rate (2 Hydraulic Dredges)	3,563	gpm			assume operate 24/7
Unit, Purchase (Hydraulic Dredge)	\$2,586,470	LS			pj
Flow Rate (2 Hydraulic Dredges; settling pond)	3,110	gpm			assume operate 24/7
Flow Rate (mechanical dewatering)	3,563	gpm			
Unit, Purchase (mechanical dewatering)	\$2,586,470	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Length of piping for treated water discharge	20,000	feet			Distance from town of Holland to river per map provided by Fred Swed
Disposal					
Existing NR 500 Commercial Disposal Facility					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Conveyer System Construction	1,000,000	LS			pj
New Landfill Disposal (Dedicated NR 500 Monofill)					
Landfill Construction	\$23,343,896				
Local Siting Fee	\$5	per cy			
Closure Cap	\$100,000	per acre			
Operating Cost	\$500,000	per year			
Post-closure Monitoring	\$30,000	per year			

Institutional Controls

Public Education Program	\$100,000	pj
O&M Plans	\$20,000	pj
Deed Restrictions	\$5,000	pj
<u>Annual Costs</u>		
Public Education Program	\$30,000	pj
Maintaining O&M Plans	\$800	pj
Reporting	\$20,000	pj
Long-term Monitoring	\$600,000	Anne LTM
Long-term Monitoring (no action)	\$300,000	Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000
TOTAL COST			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	3,248	Day	24.98461538 \$55,216,000
Dredge Monitoring (Water Quality)	3,248	Day	\$9,744,000
Sediment Removal QA	3,248	Day	\$3,897,600
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$71,352,600
Engineering, Procurement & Construction Management:			8,562,312
Contractor Overhead/Profit:			10,702,890
Total Capital:			\$90,600,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	57	gpm	\$216,590
Water Treatment (Includes Operator)	124,598,376	gal	\$49,839
Water Treatment QA	1,516	day	\$303,200
Direct Capital:			\$569,629
Engineering, Procurement & Construction Management:			68,355
Total Capital:			\$600,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	6,454,322	ton	\$161,358,055
Lime Purchase	645,433	ton	\$38,725,980
Soil Loading	6,454,322	ton	\$18,072,102
Soil Hauling	6,454,322	ton	\$30,254,635
Tipping Fees (non-TSCA)	6,202,427	ton	\$266,704,347
Tipping Fees (TSCA)	251,896	ton	\$13,854,253
Direct Capital:			\$528,969,373
Engineering, Procurement & Construction Management:			63,476,325
Total Capital:			\$592,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$692,300,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units		Cost
Site Preparation	2	LS		\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	1083	acre		\$17,328,000
Dredging - 2 12 hour shifts/day	1070	Day	5.879120879	\$30,388,000
Dredge Monitoring (Water Quality)	1070	Day		\$6,420,000
Sediment Removal QA	1070	Day		\$2,568,000
Piping	95,000	ft		\$6,365,000
Road Crossings	12	ea		\$600,000
Booster Pumps	4	ea		\$10,700,000
Winter Over All Equipment	6	yr		\$1,710,000
Site Restoration	1	LS		\$600,000
Direct Capital:				\$79,455,800
Engineering, Procurement & Construction Management:				9,534,696
Contractor Overhead/Profit:				11,918,370
Total Capital:				\$100,900,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	3,563	gpm		\$2,586,470
Water Treatment (Including Operator)	5,485,286,920	gal		\$2,194,115
Water Treatment QA	1,070	Day		\$428,000
Piping	20,000	ft		\$1,340,000
Direct Capital:				\$6,548,584
Engineering, Procurement & Construction Management:				785,830
Total Capital:				\$7,300,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units		Cost
Landfill Construction	1	LS		\$23,343,896
Local Siting Fee	3,687,026	cy		\$18,435,132
Closure	114	acres		\$11,426,735
Direct Capital:				\$53,205,763
Engineering, Procurement & Construction Management:				6,384,692
Total Capital:				\$59,600,000
Present Worth of Longer Term Operating Costs		Years	Annual Cost	
Operations		10	\$500,000	\$3,680,044
Post Closure Monitoring		40	\$30,000	\$252,053
Total Present Worth, Longer Term O&M Costs				\$3,932,097
Total Project Capital and O&M Cost				\$63,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units		Cost
Deed Restrictions	1	LS		\$5,000
Direct Capital:				\$5,000
Engineering, Procurement & Construction Management:				600
Total Capital:				\$5,600
Present Worth of Longer Term Operating Costs		Years	Annual Cost	
Long-term Monitoring (no action)		40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs				\$4,513,889
Total Project Capital and O&M Cost				\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$176,500,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facilities

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1083	acre	\$17,328,000
Dredging - 2 12 hour shifts/day	1070	Day	\$30,388,000
Dredge Monitoring (Water Quality)	1070	Day	\$6,420,000
Sediment Removal QA	1070	Day	\$2,568,000
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$10,700,000
Winter Over All Equipment	6	yr	\$1,710,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$79,455,800
Engineering, Procurement & Construction Management:			9,534,696
Contractor Overhead/Profit:			11,918,370
Total Capital:			\$100,900,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	4,787,933,264	gal	\$1,915,173
Water Treatment QA	1,070	Day	\$428,000
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$6,269,643
Engineering, Procurement & Construction Management:			752,357
Total Capital:			\$7,000,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	7,271,870	ton	\$181,796,742
Lime Purchase	727,187	ton	\$43,631,220
Sediment Loading	7,271,870	ton	\$20,361,235
Sediment Hauling	7,271,870	ton	\$34,086,889
Landfill Construction	1	LS	\$23,343,896
Local Siting Fee	3,687,026	cy	\$18,435,132
Closure	114	acres	\$11,426,735
Direct Capital:			\$333,081,849
Engineering, Procurement & Construction Management:			39,969,822
Total Capital:			\$373,100,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$252,053
Total Present Worth, Longer Term O&M Costs			\$3,932,097
Total Project Capital and O&M Cost			\$377,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$513,500,000

ALTERNATIVE C3: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)**SEDIMENT REMOVAL (2 - 12-inch CUTTERHEADS)**

Capital Items	Quantity	Units		Cost
Site Preparation	2	LS		\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	1083	acre		\$17,328,000
Dredging - 2 12 hour shifts/day	1070	Day	5.879120879	\$30,388,000
Dredge Monitoring (Water Quality)	1070	Day		\$6,420,000
Sediment Removal QA	1070	Day		\$2,568,000
Winter Over All Equipment	6	yr		\$1,710,000
Site Restoration	1	LS		\$600,000
Direct Capital:				\$61,790,800
Engineering, Procurement & Construction Management:				7,414,896
Contractor Overhead/Profit:				9,268,620
Total Capital:				\$78,500,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units		Cost
Mobilization/Site Prep	1	LS		\$100,000
Dewatering	2,181,561	bd		\$174,524,872
Direct Capital:				\$174,624,872
Engineering, Procurement & Construction Management:				20,954,985
Total Capital:				\$195,600,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	3,563	gpm		\$2,586,470
Water Treatment (Includes Operator)	5,485,286,920	gal		\$2,194,115
Water Treatment QA	2,994	day		\$598,800
Direct Capital:				\$5,379,384
Engineering, Procurement & Construction Management:				645,526
Total Capital:				\$6,000,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units		Cost
Soil Loading	4,363,122	ton		\$12,216,741
Soil Hauling	4,363,122	ton		\$20,452,133
Tipping Fees (non-TSCA)	4,192,840	ton		\$180,292,139
Tipping Fees (TSCA)	170,281	ton		\$9,365,475
Direct Capital:				\$222,326,488
Engineering, Procurement & Construction Management:				26,679,179
Total Capital:				\$249,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units		Cost
Deed Restrictions	1	LS		\$5,000
Direct Capital:				\$5,000
Engineering, Procurement & Construction Management:				600
Total Capital:				\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost		
Long-term Monitoring (no action)	40	\$300,000		\$4,513,889
Total Present Worth, Longer Term O&M Costs				\$4,513,889
Total Project Capital and O&M Cost				\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000

Present Worth of Direct Capital:	\$2,766,749
Engineering, Procurement & Construction Management:	\$332,010

Total Capital: **\$3,098,759**

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659

Total Present Worth, Longer Term O&M Costs **\$1,056,130**

Total Project Capital and O&M Cost **\$4,200,000**

TOTAL COST **\$537,800,000**

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	3,248	Day	\$55,216,000
Dredge Monitoring (Water Quality)	3,248	Day	\$9,744,000
Sediment Removal QA	3,248	Day	\$3,897,600
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000

Direct Capital:	\$71,352,600
Engineering, Procurement & Construction Management:	8,562,312
Contractor Overhead/Profit:	10,702,890

Total Capital: **\$90,600,000**

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835

Direct Capital:	\$20,117,835
Engineering, Procurement & Construction Management:	\$2,414,140

Total Capital: **\$22,531,975**

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456

Total Present Worth, Longer Term O&M Costs **\$16,711,012**

Total Project Capital and O&M Cost **\$39,200,000**

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	298,239,928	gal	\$119,296
Water Treatment QA	1,516	day	\$303,200

Direct Capital:	\$992,994
Engineering, Procurement & Construction Management:	119,159

Total Capital: **\$1,100,000**

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	4,218,890	ton	\$105,472,250
Lime Purchase	421,889	ton	\$25,313,340
Soil Loading	4,218,890	ton	\$11,812,892
Soil Hauling	4,218,890	ton	\$19,776,047
Tipping Fees (non-TSCA)	3,966,994	ton	\$170,580,761
Tipping Fees (TSCA)	385,366	ton	\$21,195,108
Direct Capital:			\$354,150,398
Engineering, Procurement & Construction Management:			42,498,048
Total Capital:			\$396,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$536,200,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment

SEDIMENT REMOVAL (2 - 12-inch CUTTERHEAD'S)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1083	acre	\$17,328,000
Dredging - 2 12 hour shifts/day	1070	Day	5.879120879 \$30,388,000
Dredge Monitoring (Water Quality)	1070	Day	\$6,420,000
Sediment Removal QA	1070	Day	\$2,568,000
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$10,700,000
Winter Over All Equipment	6	yr	\$1,710,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$79,455,800
Engineering, Procurement & Construction Management:			9,534,696
Contractor Overhead/Profit:			11,918,370
Total Capital:			\$100,900,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	4,787,933,264	gal	\$1,915,173
Water Treatment QA	1,070	Day	\$428,000
Piping	95,000	ft	\$6,365,000
Direct Capital:			\$11,294,643
Engineering, Procurement & Construction Management:			1,355,357
Total Capital:			\$12,700,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units	Cost
Sediment Treatment	7,271,870	ton	\$174,524,872
Soil Loading	7,271,870	ton	\$20,361,235
Soil Hauling	7,271,870	ton	\$8,521,722
Direct Capital:			\$203,407,829
Engineering, Procurement & Construction Management:			\$24,408,940
Total Capital:			\$227,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$370,000,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible,Dredge to CDF and Off-site Disposal

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835
Direct Capital:			\$20,117,835
Engineering, Procurement & Construction Management:			\$2,414,140
Total Capital:			\$22,531,975
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456
Total Present Worth, Longer Term O&M Costs			\$16,711,012
Total Project Capital and O&M Cost			\$39,200,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	1,739,831	tons	\$10,438,985
Sand Placement	1,242,736	cy	\$7,456,418
Cobble Purchase and Placement	745,642	cy	\$22,369,254
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$40,564,657
Engineering, Procurement & Construction Management:			4,867,759
Total Capital:			\$45,432,416
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$908,648	\$13,671,792
Total Present Worth, Longer Term O&M Costs			\$19,690,311
Total Project Capital and O&M Cost			\$65,100,000

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	2,233	Day	\$37,961,000
Dredge Monitoring (Water Quality)	2,233	Day	\$6,699,000
Sediment Removal QA	2,233	Day	\$2,679,600
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$49,834,600
Engineering, Procurement & Construction Management:			5,980,152
Contractor Overhead/Profit:			7,475,190
Total Capital:			\$63,300,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	259,327,325	gal	\$103,731
Water Treatment QA	1,516	day	\$303,200
Direct Capital:			\$977,429
Engineering, Procurement & Construction Management:			117,291
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	2,203,177	ton	\$55,079,425
Lime Purchase	220,318	ton	\$13,219,080
Soil Loading	2,203,177	ton	\$6,168,896
Soil Hauling	2,203,177	ton	\$10,327,392
Tipping Fees (non-TSCA)	1,951,281	ton	\$83,905,104
Tipping Fees (TSCA)	251,896	ton	\$13,854,253
Direct Capital:			\$182,554,150
Engineering, Procurement & Construction Management:			21,906,498
Total Capital:			\$204,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$381,900,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
DE PERE TO GREEN BAY
Action Level - 1,000 ppb

Material Handling Assumptions:

Volume > 1000 ppb	5,879,529	cy	1034	ac	4,488,190	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	6,868,500	cy			5,243,130	m3	
Volume > 250 ppb	6,449,065	cy			4,922,950	m3	
Volume > 500 ppb	6,169,458	cy			4,709,510	m3	
Volume > 5000 ppb	4,517,391	cy			3,448,390	m3	
Volume > 50,000 ppb	240,778	cy			183,800	m3	
Solids Specific Gravity	2.36						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Slurry Density (20% in situ)	8.0%	w/w	3.6%	v/v	0.88	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	15.4%	v/v	1.02	tons per cy	Montgomery Watson
Dewatered Density (Hydraulic Dredging and CDF)	50.0%	w/w	29.8%	v/v	1.18	tons per cy	Foth & VanDyke
Dewatered Density (Mechanical Dredging)	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Treated Density	93.4%	w/w	60.0%	v/v	1.28	tons per cy	
CDF Capacity	2,136,771	cy		in situ	974,801	m3	
HTTD Treatment Capacity	1,577,177	cy		in situ	1,650,000	tons	
Cap Volume	1,833,253	cy			1,399,430	m3	
Vitrification Treatment Capacity	9,106,166	cy		in situ	6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						
Sales Tax	5.5%						Not Used
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					
Debris Sweep	\$16,000	per acre					Ogden Beeman
Hydraulic - 2 12-inch Cutterheads							
Site Preparation	\$803,400	LS					Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift					Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift					Ogden Beeman
Winter Over Equipment	\$285,000	per year					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					Ogden Beeman
Length of Piping	95,000	ft			18	mi	Distance to Town of Holland (map provided by Fred Swed). 11 mi of hard piping plus 7 mi of floating pipe
Piping Purchase/Installation	\$67	per ft					Ogden Beeman
Number of Road Crossings	12	each					pj, review map
Cost per Road Crossing	\$50,000	per crossing					pj, review map
Number of Booster Pumps	4	each					Ogden Beeman
Booster Pump Cost	\$2,500	per day					Ogden Beeman
Mechanical - 8 cy bucket							
Dock Construction	\$400,000	LS					pj
Mobilization - Equipment	\$455,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS					Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea					Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$17,000	per shift					Ogden Beeman
Dredge Rate	1900	cy in situ per 10 hour shift					Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area					pj
Free Water per cy Dredged (10%)	20	gal					Ogden Beeman
Offload Crane Mobilization	\$50,000	LS					pj
Site Restoration	\$500,000	LS					pj
High Temperature Thermal Desorption							
Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					
Vitrification							
Capital Costs	\$36,000,000	LS					Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year					Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton					Unit Cost Study- Minergy

Capping					
Mobilization/Site Prep	\$200,000				Ogden Beeman
Area	19,041,971	sf	1,769,100	m2	
Sand Cap Depth	1.7	feet			
Sand Purchase	\$6	per ton			Ole
Placement Rate	\$6	per cy			Ogden Beeman
Sand Density	1.4	tons per cy			
Armored Cap Depth	1.0	feet			
Cobbles	\$30	per cy			Means
Sand Density	1.4	tons per cy			
Cap Placement QA	\$100,000	LS			Ogden Beeman
Long-term O&M	2%	of capital			pj
Long-term Monitoring	\$400,000	per year			Anne LTM
Nearshore CDF					
			<u>Bayport</u>		
Land Lease or Purchase	\$1.80	per sf			Baird
Length	9,600	lf			Baird
Capping Volume	205,000	cy	2,178,000		Baird
Seeding Area	300,000	sy	2,178,000		Baird
Sheetpile Wall Length	9,600	lf			based on bathymetry
Sheetpile Depth	30	ft			pj
Sheetpile Cost	\$19	per sf			Baird
Shot Rock Berm	\$500	per lf			Baird
Rip Rap	\$210	per lf			pj
Clean Soil Cap	\$10	per cy			Baird
Seeding	\$1	per sy			Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10.0%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
Dewatering - Mechanical					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
Dewatering - Upland Pond (2 cells)					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	4,491,228	sf	103.10		2 days slurry + 13 wk solids * 2 cells * 2 shifts per day
Perimeter	8,477	lf	2119.251741		assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
Water Treatment					
Flow Rate (3 Mechanical Dredges)	57	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges)	\$216,590	LS			pj
Flow Rate (3 Mechanical Dredges to CDF)	287	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges to CDF)	\$570,498	LS			pj
Flow Rate (2 Hydraulic Dredges)	3,563	gpm			assume operate 24/7
Unit, Purchase (Hydraulic Dredge)	\$2,586,470	LS			pj
Flow Rate (2 Hydraulic Dredges; settling pond)	3,110	gpm			assume operate 24/7
Flow Rate (mechanical dewatering)	3,563	gpm			
Unit, Purchase (mechanical dewatering)	\$2,586,470	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Length of piping for treated water discharge	20,000	feet			Distance from town of Holland to river per map provided by Fred Swed
Disposal					
Existing NR 500 Commercial Disposal Facility					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Conveyer System Construction	1,000,000	LS			pj
New Landfill Disposal (Dedicated NR 500 Monofill)					
Landfill Construction	\$22,246,866				
Local Siting Fee	\$5	per cy			
Closure Cap	\$100,000	per acre			
Operating Cost	\$500,000	per year			
Post-closure Monitoring	\$30,000	per year			

Institutional Controls

Public Education Program	\$100,000	pj
O&M Plans	\$20,000	pj
Deed Restrictions	\$5,000	pj
<u>Annual Costs</u>		
Public Education Program	\$30,000	pj
Maintaining O&M Plans	\$800	pj
Reporting	\$20,000	pj
Long-term Monitoring	\$600,000	Anne LTM
Long-term Monitoring (no action)	\$300,000	Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000
TOTAL COST			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	3,095	Day	23.80769231 \$52,615,000
Dredge Monitoring (Water Quality)	3,095	Day	\$9,285,000
Sediment Removal QA	3,095	Day	\$3,714,000
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$68,109,000
Engineering, Procurement & Construction Management:			8,173,080
Contractor Overhead/Profit:			10,216,350
Total Capital:			\$86,500,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	57	gpm	\$216,590
Water Treatment (Includes Operator)	118,742,966	gal	\$47,497
Water Treatment QA	1,445	day	\$289,000
Direct Capital:			\$553,087
Engineering, Procurement & Construction Management:			66,370
Total Capital:			\$600,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	6,151,006	ton	\$153,775,150
Lime Purchase	615,101	ton	\$36,906,060
Soil Loading	6,151,006	ton	\$17,222,817
Soil Hauling	6,151,006	ton	\$28,832,841
Tipping Fees (non-TSCA)	5,899,111	ton	\$253,661,752
Tipping Fees (TSCA)	251,896	ton	\$13,854,253
Direct Capital:			\$504,252,872
Engineering, Procurement & Construction Management:			60,510,345
Total Capital:			\$564,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$660,600,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units		Cost
Site Preparation	2	LS		\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	1034	acre		\$16,544,000
Dredging - 2 12 hour shifts/day	1019	Day	5.598901099	\$28,939,600
Dredge Monitoring (Water Quality)	1019	Day		\$6,114,000
Sediment Removal QA	1019	Day		\$2,445,600
Piping	95,000	ft		\$6,365,000
Road Crossings	12	ea		\$600,000
Booster Pumps	4	ea		\$10,190,000
Winter Over All Equipment	6	yr		\$1,710,000
Site Restoration	1	LS		\$600,000
Direct Capital:				\$76,285,000
Engineering, Procurement & Construction Management:				9,154,200
Contractor Overhead/Profit:				11,442,750
Total Capital:				\$96,900,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	3,563	gpm		\$2,586,470
Water Treatment (Including Operator)	5,227,509,847	gal		\$2,091,004
Water Treatment QA	1,019	Day		\$407,600
Piping	20,000	ft		\$1,340,000
Direct Capital:				\$6,425,074
Engineering, Procurement & Construction Management:				771,009
Total Capital:				\$7,200,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units		Cost
Landfill Construction	1	LS		\$22,246,866
Local Siting Fee	3,513,757	cy		\$17,568,787
Closure	109	acres		\$10,889,744
Direct Capital:				\$50,705,397
Engineering, Procurement & Construction Management:				6,084,648
Total Capital:				\$56,800,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$252,053
Total Present Worth, Longer Term O&M Costs			\$3,932,097
Total Project Capital and O&M Cost			\$60,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$169,600,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facilities

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1034	acre	\$16,544,000
Dredging - 2 12 hour shifts/day	1019	Day	\$28,939,600
Dredge Monitoring (Water Quality)	1019	Day	\$6,114,000
Sediment Removal QA	1019	Day	\$2,445,600
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$10,190,000
Winter Over All Equipment	6	yr	\$1,710,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$76,285,000
Engineering, Procurement & Construction Management:			9,154,200
Contractor Overhead/Profit:			11,442,750
Total Capital:			\$96,900,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	4,562,927,820	gal	\$1,825,171
Water Treatment QA	1,019	Day	\$407,600
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$6,159,241
Engineering, Procurement & Construction Management:			739,109
Total Capital:			\$6,900,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	6,930,133	ton	\$173,253,336
Lime Purchase	693,014	ton	\$41,580,840
Sediment Loading	6,930,133	ton	\$19,404,374
Sediment Hauling	6,930,133	ton	\$32,485,000
Landfill Construction	1	LS	\$22,246,866
Local Siting Fee	3,513,757	cy	\$17,568,787
Closure	109	acres	\$10,889,744

Direct Capital: \$317,428,947

Engineering, Procurement & Construction Management: 38,091,474

Total Capital: \$355,500,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$252,053

Total Present Worth, Longer Term O&M Costs \$3,932,097

Total Project Capital and O&M Cost \$359,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000

Direct Capital: \$5,000

Engineering, Procurement & Construction Management: 600

Total Capital: \$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889

Total Present Worth, Longer Term O&M Costs \$4,513,889

Total Project Capital and O&M Cost \$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000

Present Worth of Direct Capital: \$2,766,749

Engineering, Procurement & Construction Management: \$332,010

Total Capital: \$3,098,759

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659

Total Present Worth, Longer Term O&M Costs \$1,056,130

Total Project Capital and O&M Cost \$4,200,000

TOTAL COST \$491,800,000

ALTERNATIVE C3: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)**SEDIMENT REMOVAL (2 - 12-inch CUTTERHEADS)**

Capital Items	Quantity	Units		Cost
Site Preparation	2	LS		\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	1034	acre		\$16,544,000
Dredging - 2 12 hour shifts/day	1019	Day	5.598901099	\$28,939,600
Dredge Monitoring (Water Quality)	1019	Day		\$6,114,000
Sediment Removal QA	1019	Day		\$2,445,600
Winter Over All Equipment	6	yr		\$1,710,000
Site Restoration	1	LS		\$600,000
Direct Capital:				\$59,130,000
Engineering, Procurement & Construction Management:				7,095,600
Contractor Overhead/Profit:				8,869,500
Total Capital:				\$75,100,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units		Cost
Mobilization/Site Prep	1	LS		\$100,000
Dewatering	2,079,040	bdt		\$166,323,203
Direct Capital:				\$166,423,203
Engineering, Procurement & Construction Management:				19,970,784
Total Capital:				\$186,400,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	3,563	gpm		\$2,586,470
Water Treatment (Includes Operator)	5,227,509,847	gal		\$2,091,004
Water Treatment QA	2,854	day		\$570,800
Direct Capital:				\$5,248,274
Engineering, Procurement & Construction Management:				629,793
Total Capital:				\$5,900,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units		Cost
Soil Loading	4,158,080	ton		\$11,642,624
Soil Hauling	4,158,080	ton		\$19,491,000
Tipping Fees (non-TSCA)	3,987,799	ton		\$171,475,344
Tipping Fees (TSCA)	170,281	ton		\$9,365,475
Direct Capital:				\$211,974,444
Engineering, Procurement & Construction Management:				25,436,933
Total Capital:				\$237,400,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units		Cost
Deed Restrictions	1	LS		\$5,000
Direct Capital:				\$5,000
Engineering, Procurement & Construction Management:				600
Total Capital:				\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost		
Long-term Monitoring (no action)	40	\$300,000		\$4,513,889
Total Present Worth, Longer Term O&M Costs				\$4,513,889
Total Project Capital and O&M Cost				\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$513,500,000

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	3,095	Day	\$52,615,000
Dredge Monitoring (Water Quality)	3,095	Day	\$9,285,000
Sediment Removal QA	3,095	Day	\$3,714,000
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$68,109,000
Engineering, Procurement & Construction Management:			8,173,080
Contractor Overhead/Profit:			10,216,350
Total Capital:			\$86,500,000

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835
Direct Capital:			\$20,117,835
Engineering, Procurement & Construction Management:			\$2,414,140
Total Capital:			\$22,531,975
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456
Total Present Worth, Longer Term O&M Costs			\$16,711,012
Total Project Capital and O&M Cost			\$39,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	292,384,518	gal	\$116,954
Water Treatment QA	1,445	day	\$289,000
Direct Capital:			\$976,452
Engineering, Procurement & Construction Management:			117,174
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	3,915,574	ton	\$97,889,350
Lime Purchase	391,558	ton	\$23,493,480
Soil Loading	3,915,574	ton	\$10,963,607
Soil Hauling	3,915,574	ton	\$18,354,253
Tipping Fees (non-TSCA)	3,663,678	ton	\$157,538,173
Tipping Fees (TSCA)	395,705	ton	\$21,763,760
Direct Capital:			\$330,002,623
Engineering, Procurement & Construction Management:			39,600,315
Total Capital:			\$369,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$505,100,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment

SEDIMENT REMOVAL (2 - 12-inch CUTTERHEAD'S)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	1034	acre	\$16,544,000
Dredging - 2 12 hour shifts/day	1019	Day	\$28,939,600
Dredge Monitoring (Water Quality)	1019	Day	\$6,114,000
Sediment Removal QA	1019	Day	\$2,445,600
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$10,190,000
Winter Over All Equipment	6	yr	\$1,710,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$76,285,000
Engineering, Procurement & Construction Management:			9,154,200
Contractor Overhead/Profit:			11,442,750
Total Capital:			\$96,900,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	4,562,927,820	gal	\$1,825,171
Water Treatment QA	1,019	Day	\$407,600
Piping	95,000	ft	\$6,365,000
Direct Capital:			\$11,184,241
Engineering, Procurement & Construction Management:			1,342,109
Total Capital:			\$12,500,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units	Cost
Sediment Treatment	6,930,133	ton	\$166,323,203
Soil Loading	6,930,133	ton	\$19,404,374
Soil Hauling	6,930,133	ton	\$8,121,250
Direct Capital:			\$193,848,826
Engineering, Procurement & Construction Management:			\$23,261,859
Total Capital:			\$217,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$355,100,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible,Dredge to CDF and Off-site Disposal

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835
Direct Capital:			\$20,117,835
Engineering, Procurement & Construction Management:			\$2,414,140
Total Capital:			\$22,531,975
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456
Total Present Worth, Longer Term O&M Costs			\$16,711,012
Total Project Capital and O&M Cost			\$39,200,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	1,645,602	tons	\$9,873,614
Sand Placement	1,175,430	cy	\$7,052,582
Cobble Purchase and Placement	705,258	cy	\$21,157,745
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$38,383,942
Engineering, Procurement & Construction Management:			4,606,073
Total Capital:			\$42,990,015
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$859,800	\$12,936,810
Total Present Worth, Longer Term O&M Costs			\$18,955,329
Total Project Capital and O&M Cost			\$61,900,000

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	2,130	Day	\$36,210,000
Dredge Monitoring (Water Quality)	2,130	Day	\$6,390,000
Sediment Removal QA	2,130	Day	\$2,556,000
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$47,651,000
Engineering, Procurement & Construction Management:			5,718,120
Contractor Overhead/Profit:			7,147,650
Total Capital:			\$60,500,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	255,360,134	gal	\$102,144
Water Treatment QA	1,445	day	\$289,000
Direct Capital:			\$961,642
Engineering, Procurement & Construction Management:			115,397
Total Capital:			\$1,100,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	1,997,673	ton	\$49,941,825
Lime Purchase	199,768	ton	\$11,986,080
Soil Loading	1,997,673	ton	\$5,593,484
Soil Hauling	1,997,673	ton	\$9,364,092
Tipping Fees (non-TSCA)	1,745,777	ton	\$75,068,429
Tipping Fees (TSCA)	251,896	ton	\$13,854,257
Direct Capital:			\$165,808,168
Engineering, Procurement & Construction Management:			19,896,980
Total Capital:			\$185,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$357,100,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
DE PERE TO GREEN BAY
Action Level - 5,000 ppb

Material Handling Assumptions:

Volume > 5000 ppb	4,517,391	cy	715	ac	3,448,390	m3	Acres corresponds to dredge footprint area
Volume > 125 ppb	6,868,500	cy			5,243,130	m3	
Volume > 250 ppb	6,449,065	cy			4,922,950	m3	
Volume > 500 ppb	6,169,458	cy			4,709,510	m3	
Volume > 1000 ppb	5,879,529	cy			4,488,190	m3	
Volume > 50,000 ppb	240,778	cy			183,800	m3	
Solids Specific Gravity	2.36						
Fresh Water Density	62.4	lb/ft3					
In Situ Density	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Slurry Density (20% in situ)	8.0%	w/w	3.6%	v/v	0.88	tons per cy	Ogden Beeman
Dewatered Density (settling pond)	30%	w/w	15.4%	v/v	1.02	tons per cy	Montgomery Watson
Dewatered Density (Hydraulic Dredging and CDF)	50.0%	w/w	29.8%	v/v	1.18	tons per cy	Foth & VanDyke
Dewatered Density (Mechanical Dredging)	33.8%	w/w	17.8%	v/v	1.05	tons per cy	
Treated Density	93.4%	w/w	60.0%	v/v	1.28	tons per cy	
CDF Capacity	2,136,771	cy		in situ	974,801	m3	
HTTD Treatment Capacity	1,577,177	cy		in situ	1,650,000	tons	
Cap Volume	1,415,350	cy			1,080,420	m3	
Vitrification Treatment Capacity	9,106,166	cy		in situ	6440000.00	tons	

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%						
Sales Tax	5.5%						Not Used
Engineering, Procurement and Construction Mgmt	12.0%						
Contractor Overhead and Profit - Dredging Only	15.0%						

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day					
Sediment Removal QA	\$1,200	per day					
Debris Sweep	\$16,000	per acre					Ogden Beeman
Hydraulic - 2 12-inch Cutterheads							
Site Preparation	\$803,400	LS					Ogden Beeman
Mobilization - Equipment	\$1,135,000	LS					Ogden Beeman
Mobilization - Silt Curtain	\$35,000						Ogden Beeman
Shift Rate (12 hours)	\$14,200	per shift					Ogden Beeman
Dredge Rate	2885	cy in situ per 12 hour shift					Ogden Beeman
Winter Over Equipment	\$285,000	per year					Ogden Beeman
Site Restoration	\$600,000	per dredge launch site					Ogden Beeman
Length of Piping	95,000	ft			18	mi	Distance to Town of Holland (map provided by Fred Swed). 11 mi of hard piping plus 7 mi of floating pipe
Piping Purchase/Installation	\$67	per ft					Ogden Beeman
Number of Road Crossings	12	each					pj, review map
Cost per Road Crossing	\$50,000	per crossing					pj, review map
Number of Booster Pumps	4	each					Ogden Beeman
Booster Pump Cost	\$2,500	per day					Ogden Beeman
Mechanical - 8 cy bucket							
Dock Construction	\$400,000	LS					pj
Mobilization - Equipment	\$455,000	per dredge					Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS					Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea					Ogden Beeman - JAG estimate
Shift Rate (10 hours)	\$17,000	per shift					Ogden Beeman
Dredge Rate	1900	cy in situ per 10 hour shift					Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area					pj
Free Water per cy Dredged (10%)	20	gal					Ogden Beeman
Offload Crane Mobilization	\$50,000	LS					pj
Site Restoration	\$500,000	LS					pj
High Temperature Thermal Desorption							
Setup Staging Area	\$50,000						pj
Mobilization/Site Prep	\$150,000						Maxymillian
Sediment Treatment QA	\$2	per ton					
Ratio of Amending Sand Volume to Dredge Vol.	0.25	:1					
Sand Purchase and Deliver	\$6	per ton					Ole
Blending	\$25	per ton					Ole
HTTD (includes off-gas treatment)	\$75	per ton					Maxymillian
Stack Testing	\$50,000	LS					Maxymillian
Place Treated Material	\$3	per ton					
Vitrification							
Capital Costs	\$36,000,000	LS					Unit Cost Study- Minergy
Operating Costs	\$6,800,000	per year					Unit Cost Study- Minergy
Vitrification (Unit Cost includes Cap and Oper Costs)	\$24.0	per ton					Unit Cost Study- Minergy

Capping					
Mobilization/Site Prep	\$200,000				Ogden Beeman
Area	12,497,672	sf	1,161,100	m2	
Sand Cap Depth	1.7	feet			
Sand Purchase	\$6	per ton			Ole
Placement Rate	\$6	per cy			Ogden Beeman
Sand Density	1.4	tons per cy			
Armored Cap Depth	1.0	feet			
Cobbles	\$30	per cy			Means
Sand Density	1.4	tons per cy			
Cap Placement QA	\$100,000	LS			Ogden Beeman
Long-term O&M	2%	of capital			pj
Long-term Monitoring	\$400,000	per year			Anne LTM
Nearshore CDF					
			<u>Bayport</u>		
Land Lease or Purchase	\$1.80	per sf			Baird
Length	9,600	lf			Baird
Capping Volume	205,000	cy	2,178,000		Baird
Seeding Area	300,000	sy	2,178,000		Baird
Sheetpile Wall Length	9,600	lf			based on bathymetry
Sheetpile Depth	30	ft			pj
Sheetpile Cost	\$19	per sf			Baird
Shot Rock Berm	\$500	per lf			Baird
Rip Rap	\$210	per lf			pj
Clean Soil Cap	\$10	per cy			Baird
Seeding	\$1	per sy			Baird
Mitigation	\$10,000	per acre			Tim
	\$10,000	per year			Tim
Long-term Monitoring	\$650,000	per year			Anne LTM
Long-term O&M	2%	of capital			pj
Solidification					
Percent Lime	10.0%	(w/w)			Montgomery Watson
Lime	\$60	per ton	Mixing	\$25 per ton	pj, pug mill mixing
<u>Dewatering - Mechanical</u>					
Mobilization	\$100,000				pj
Holding Pond-Centrifuge	\$80	per bone dry ton			Global Dewatering
<u>Dewatering - Upland Pond (2 cells)</u>					
Land Lease or Purchase	\$1.80	per sf			Ole
Area	4,491,228	sf	103.10		2 days slurry + 13 wk solids * 2 cells * 2 shifts per day
Perimeter	8,477	lf	2119.251741		assume square
Depth of Material in Dewatering Cell	8	feet			based on size at Arrowhead Park
Cell Retention Time	24	hours			Not Used
Cell Depth	10	feet			
Mobilization	\$20,000	LS			
Clear and Grub	\$2,000	per acre			pj
Berm Volume	10.4	cy per lf			2:1 slope, 8-foot top
Berm Construction	\$6	per cy			pj
Rough Grading	\$0.25	per sf			pj
Alphalt Liner	\$1.50	per sf			pj, 2 2-inch lifts
Demob/Disposal	\$10,000	LS			pj
Regrade Berm Soils	\$6	per cy			pj
Seed/Sod	\$1	per sy			Baird
<u>Water Treatment</u>					
Flow Rate (3 Mechanical Dredges)	57	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges)	\$216,590	LS			pj
Flow Rate (3 Mechanical Dredges to CDF)	287	gpm			assume operate 24/7
Unit, Purchase (3 Mechanical Dredges to CDF)	\$570,498	LS			pj
Flow Rate (2 Hydraulic Dredges)	3,563	gpm			assume operate 24/7
Unit, Purchase (Hydraulic Dredge)	\$2,586,470	LS			pj
Flow Rate (2 Hydraulic Dredges; settling pond)	3,110	gpm			assume operate 24/7
Flow Rate (mechanical dewatering)	3,563	gpm			
Unit, Purchase (mechanical dewatering)	\$2,586,470	LS			
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons			pj
Water Treatment QA	\$200	per day			pj, 1 sample/day
Length of piping for treated water discharge	20,000	feet			Distance from town of Holland to river per map provided by Fred Swed
<u>Disposal</u>					
Existing NR 500 Commercial Disposal Facility					
Load Soil for Hauling	\$2.80	per ton			pj
Round-trip Hauling	2	hours			pj
Round-trip Hauling (to Vittrification Facility)	0.5	hours			pj
Tipping Fee (non-TSCA)	\$43	per ton			St. Paul
Tipping Fee (TSCA)	\$55	per ton			St. Paul
Truck Rate	\$75	per hour			pj
Truck Load	32	tons			pj
Conveyer System Construction	1,000,000	LS			pj
New Landfill Disposal (Dedicated NR 500 Monofill)					
Landfill Construction	\$17,092,830				
Local Siting Fee	\$5	per cy			
Closure Cap	\$100,000	per acre			
Operating Cost	\$500,000	per year			
Post-closure Monitoring	\$30,000	per year			

Institutional Controls

Public Education Program	\$100,000	pj
O&M Plans	\$20,000	pj
Deed Restrictions	\$5,000	pj
<u>Annual Costs</u>		
Public Education Program	\$30,000	pj
Maintaining O&M Plans	\$800	pj
Reporting	\$20,000	pj
Long-term Monitoring	\$600,000	Anne LTM
Long-term Monitoring (no action)	\$300,000	Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000
TOTAL COST			\$9,900,000

ALTERNATIVE C1: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Passive Dewatering)**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	2,378	Day	18.29230769 \$40,426,000
Dredge Monitoring (Water Quality)	2,378	Day	\$7,134,000
Sediment Removal QA	2,378	Day	\$2,853,600
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$52,908,600
Engineering, Procurement & Construction Management:			6,349,032
Contractor Overhead/Profit:			7,936,290
Total Capital:			\$67,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	57	gpm	\$216,590
Water Treatment (Includes Operator)	91,233,227	gal	\$36,493
Water Treatment QA	1,110	day	\$222,000
Direct Capital:			\$475,083
Engineering, Procurement & Construction Management:			57,010
Total Capital:			\$500,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	4,725,974	ton	\$118,149,341
Lime Purchase	472,598	ton	\$28,355,880
Soil Loading	4,725,974	ton	\$13,232,726
Soil Hauling	4,725,974	ton	\$22,153,001
Tipping Fees (non-TSCA)	4,474,078	ton	\$192,385,360
Tipping Fees (TSCA)	251,896	ton	\$13,854,253
Direct Capital:			\$388,130,561
Engineering, Procurement & Construction Management:			46,575,667
Total Capital:			\$434,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$511,100,000

ALTERNATIVE C2A: Dredge Sediment with Combined Dewatering and Disposal Facility

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units		Cost
Site Preparation	2	LS		\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	715	acre		\$11,440,000
Dredging - 2 12 hour shifts/day	783	Day	4.302197802	\$22,237,200
Dredge Monitoring (Water Quality)	783	Day		\$4,698,000
Sediment Removal QA	783	Day		\$1,879,200
Piping	95,000	ft		\$6,365,000
Road Crossings	12	ea		\$600,000
Booster Pumps	4	ea		\$7,830,000
Winter Over All Equipment	5	yr		\$1,425,000
Site Restoration	1	LS		\$600,000
Direct Capital:				\$59,851,200
Engineering, Procurement & Construction Management:				7,182,144
Contractor Overhead/Profit:				8,977,680
Total Capital:				\$76,000,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	3,563	gpm		\$2,586,470
Water Treatment (Including Operator)	4,016,428,155	gal		\$1,606,571
Water Treatment QA	783	Day		\$313,200
Piping	20,000	ft		\$1,340,000
Direct Capital:				\$5,846,241
Engineering, Procurement & Construction Management:				701,549
Total Capital:				\$6,500,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units		Cost
Landfill Construction	1	LS		\$17,092,830
Local Siting Fee	2,699,709	cy		\$13,498,544
Closure	84	acres		\$8,366,866
Direct Capital:				\$38,958,240
Engineering, Procurement & Construction Management:				4,674,989
Total Capital:				\$43,600,000
Present Worth of Longer Term Operating Costs		Years	Annual Cost	
Operations		10	\$500,000	\$3,680,044
Post Closure Monitoring		40	\$30,000	\$252,053
Total Present Worth, Longer Term O&M Costs				\$3,932,097
Total Project Capital and O&M Cost				\$47,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units		Cost
Deed Restrictions	1	LS		\$5,000
Direct Capital:				\$5,000
Engineering, Procurement & Construction Management:				600
Total Capital:				\$5,600
Present Worth of Longer Term Operating Costs		Years	Annual Cost	
Long-term Monitoring (no action)		40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs				\$4,513,889
Total Project Capital and O&M Cost				\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$138,700,000

ALTERNATIVE C2B: Dredge Sediment with Separate Dewatering and Disposal Facilities

SEDIMENT REMOVAL (2 12-INCH CUTTERHEADS)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	715	acre	\$11,440,000
Dredging - 2 12 hour shifts/day	783	Day	\$22,237,200
Dredge Monitoring (Water Quality)	783	Day	\$4,698,000
Sediment Removal QA	783	Day	\$1,879,200
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$7,830,000
Winter Over All Equipment	5	yr	\$1,425,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$59,851,200
Engineering, Procurement & Construction Management:			7,182,144
Contractor Overhead/Profit:			8,977,680
Total Capital:			\$76,000,000

SEDIMENT DEWATERING (GRAVITY - NR 213)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	3,505,812,959	gal	\$1,402,325
Water Treatment QA	783	Day	\$313,200
Piping	20,000	ft	\$1,340,000
Direct Capital:			\$5,641,995
Engineering, Procurement & Construction Management:			677,039
Total Capital:			\$6,300,000

SEDIMENT DISPOSAL (Dedicated NR 500 Monofill)

Capital Items	Quantity	Units	Cost
Solidification	5,324,597	ton	\$133,114,924
Lime Purchase	532,460	ton	\$31,947,600
Sediment Loading	5,324,597	ton	\$14,908,872
Sediment Hauling	5,324,597	ton	\$24,959,048
Landfill Construction	1	LS	\$17,092,830
Local Siting Fee	2,699,709	cy	\$13,498,544
Closure	84	acres	\$8,366,866

Direct Capital: \$243,888,684

Engineering, Procurement & Construction Management: 29,266,642

Total Capital: \$273,200,000

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Operations	10	\$500,000	\$3,680,044
Post Closure Monitoring	40	\$30,000	\$252,053

Total Present Worth, Longer Term O&M Costs \$3,932,097

Total Project Capital and O&M Cost \$277,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000

Direct Capital: \$5,000

Engineering, Procurement & Construction Management: 600

Total Capital: \$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889

Total Present Worth, Longer Term O&M Costs \$4,513,889

Total Project Capital and O&M Cost \$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000

Present Worth of Direct Capital: \$2,766,749

Engineering, Procurement & Construction Management: \$332,010

Total Capital: \$3,098,759

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659

Total Present Worth, Longer Term O&M Costs \$1,056,130

Total Project Capital and O&M Cost \$4,200,000

TOTAL COST \$388,000,000

ALTERNATIVE C3: Dredge Sediment With Disposal at Existing NR 500 Commercial Disposal Facility (Mechanical Dewatering)**SEDIMENT REMOVAL (2 - 12-inch CUTTERHEADS)**

Capital Items	Quantity	Units		Cost
Site Preparation	2	LS		\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS		\$1,170,000
Debris Sweep	715	acre		\$11,440,000
Dredging - 2 12 hour shifts/day	783	Day	4.302197802	\$22,237,200
Dredge Monitoring (Water Quality)	783	Day		\$4,698,000
Sediment Removal QA	783	Day		\$1,879,200
Winter Over All Equipment	5	yr		\$1,425,000
Site Restoration	1	LS		\$600,000
Direct Capital:				\$45,056,200
Engineering, Procurement & Construction Management:				5,406,744
Contractor Overhead/Profit:				6,758,430
Total Capital:				\$57,200,000

SEDIMENT DEWATERING (MECHANICAL)

Capital Items	Quantity	Units		Cost
Mobilization/Site Prep	1	LS		\$100,000
Dewatering	1,597,379	bd		\$127,790,327
Direct Capital:				\$127,890,327
Engineering, Procurement & Construction Management:				15,346,839
Total Capital:				\$143,200,000

WATER TREATMENT

Capital Items	Quantity	Units		Cost
Unit Purchase	3,563	gpm		\$2,586,470
Water Treatment (Includes Operator)	4,016,428,155	gal		\$1,606,571
Water Treatment QA	2,193	day		\$438,600
Direct Capital:				\$4,631,641
Engineering, Procurement & Construction Management:				555,797
Total Capital:				\$5,200,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units		Cost
Soil Loading	3,194,758	ton		\$8,945,323
Soil Hauling	3,194,758	ton		\$14,975,429
Tipping Fees (non-TSCA)	3,024,477	ton		\$130,052,503
Tipping Fees (TSCA)	170,281	ton		\$9,365,475
Direct Capital:				\$163,338,730
Engineering, Procurement & Construction Management:				19,600,648
Total Capital:				\$182,900,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units		Cost
Deed Restrictions	1	LS		\$5,000
Direct Capital:				\$5,000
Engineering, Procurement & Construction Management:				600
Total Capital:				\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost		
Long-term Monitoring (no action)	40	\$300,000		\$4,513,889
Total Present Worth, Longer Term O&M Costs				\$4,513,889
Total Project Capital and O&M Cost				\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$397,200,000

ALTERNATIVE D: Dredge Sediment, CDF and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	2,378	Day	\$40,426,000
Dredge Monitoring (Water Quality)	2,378	Day	\$7,134,000
Sediment Removal QA	2,378	Day	\$2,853,600
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$52,908,600
Engineering, Procurement & Construction Management:			6,349,032
Contractor Overhead/Profit:			7,936,290
Total Capital:			\$67,200,000

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835
Direct Capital:			\$20,117,835
Engineering, Procurement & Construction Management:			\$2,414,140
Total Capital:			\$22,531,975
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456
Total Present Worth, Longer Term O&M Costs			\$16,711,012
Total Project Capital and O&M Cost			\$39,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	264,874,779	gal	\$105,950
Water Treatment QA	1,110	day	\$222,000
Direct Capital:			\$898,448
Engineering, Procurement & Construction Management:			107,814
Total Capital:			\$1,000,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	2,490,541	ton	\$62,263,525
Lime Purchase	249,055	ton	\$14,943,300
Soil Loading	2,490,541	ton	\$6,973,515
Soil Hauling	2,490,541	ton	\$11,674,411
Tipping Fees (non-TSCA)	2,238,645	ton	\$96,261,755
Tipping Fees (TSCA)	477,989	ton	\$26,289,406
Direct Capital:			\$218,405,911
Engineering, Procurement & Construction Management:			26,208,709
Total Capital:			\$244,600,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$360,700,000

ALTERNATIVE E: Dredge Sediment and Thermal Treatment

SEDIMENT REMOVAL (2 - 12-inch CUTTERHEAD'S)

Capital Items	Quantity	Units	Cost
Site Preparation	2	LS	\$1,606,800
Mobilization - Equipment and Silt Curtain	1	LS	\$1,170,000
Debris Sweep	715	acre	\$11,440,000
Dredging - 2 12 hour shifts/day	783	Day	4.302197802 \$22,237,200
Dredge Monitoring (Water Quality)	783	Day	\$4,698,000
Sediment Removal QA	783	Day	\$1,879,200
Piping	95,000	ft	\$6,365,000
Road Crossings	12	ea	\$600,000
Booster Pumps	4	ea	\$7,830,000
Winter Over All Equipment	5	yr	\$1,425,000
Site Restoration	1	LS	\$600,000
Direct Capital:			\$59,851,200
Engineering, Procurement & Construction Management:			7,182,144
Contractor Overhead/Profit:			8,977,680
Total Capital:			\$76,000,000

SEDIMENT DEWATERING (GRAVITY)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,491,228	sf	\$8,084,210
Mobilization	1	LS	\$20,000
Clear and Grub	4,491,228	sf	\$206,209
Berm Construction	87,910	cy	\$527,458
Rough Grading	4,491,228	sf	\$1,122,807
Liner Placement	4,491,228	sf	\$6,736,842
Demob/Disposal	1	LS	\$10,000
Regrade	87,910	cy	\$527,458
Seed/Sod	499,025	sy	\$499,025
Direct Capital:			\$17,734,010
Engineering, Procurement & Construction Management:			2,128,081
Total Capital:			\$19,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	3,110	gpm	\$2,586,470
Water Treatment (Including Operator)	3,505,812,959	gal	\$1,402,325
Water Treatment QA	783	Day	\$313,200
Piping	95,000	ft	\$6,365,000
Direct Capital:			\$10,666,995
Engineering, Procurement & Construction Management:			1,280,039
Total Capital:			\$11,900,000

SEDIMENT TREATMENT (VITRIFICATION 2x375 t Standalone Storage Units)

Capital Items	Quantity	Units	Cost
Sediment Treatment	5,324,597	ton	\$127,790,327
Soil Loading	5,324,597	ton	\$14,908,872
Soil Hauling	5,324,597	ton	\$6,239,762
Direct Capital:			\$148,938,961
Engineering, Procurement & Construction Management:			\$17,872,675
Total Capital:			\$166,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$283,300,000

ALTERNATIVE F: Cap Sediment to Maximum Extent Possible,Dredge to CDF and Off-site Disposal

CDF CONSTRUCTION

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	2,700,000	sf	\$4,860,000
Shot Rock/Rip Rap	9,600	lf	\$6,816,000
Sheetpile Placement	288,000	sf	\$5,472,000
Clean Soil Cap	205,000	cy	\$2,050,000
Seeding	300,000	sy	\$300,000
Mitigation	62	acre	\$619,835
Direct Capital:			\$20,117,835
Engineering, Procurement & Construction Management:			\$2,414,140
Total Capital:			\$22,531,975
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	450,639	\$6,780,456
Total Present Worth, Longer Term O&M Costs			\$16,711,012
Total Project Capital and O&M Cost			\$39,200,000

CAPPING

Capital Items	Quantity	Units	Cost
Mobilization/Site Prep	1	LS	\$200,000
Sand Purchase	1,080,046	tons	\$6,480,275
Sand Placement	771,461	cy	\$4,628,768
Cobble Purchase and Placement	462,877	cy	\$13,886,303
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$25,295,345
Engineering, Procurement & Construction Management:			3,035,441
Total Capital:			\$28,330,786
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$566,616	\$8,525,468
Total Present Worth, Longer Term O&M Costs			\$14,543,987
Total Project Capital and O&M Cost			\$42,900,000

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	3	LS	\$1,470,000
Watertight Barges	4	ea	\$400,000
Offload Stockpile Area Prep.	1	LS	\$75,000
Dredging - 12 hour shifts	1,633	Day	\$27,761,000
Dredge Monitoring (Water Quality)	1,633	Day	\$4,899,000
Sediment Removal QA	1,633	Day	\$1,959,600
Offload Crane Mobilization	1	LS	\$50,000
Site Restoration	1	ea	\$500,000
Direct Capital:			\$37,114,600
Engineering, Procurement & Construction Management:			4,453,752
Contractor Overhead/Profit:			5,567,190
Total Capital:			\$47,100,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	287	gpm	\$570,498
Water Treatment (Includes Operator)	236,290,366	gal	\$94,516
Water Treatment QA	1,110	day	\$222,000
Direct Capital:			\$887,014
Engineering, Procurement & Construction Management:			106,442
Total Capital:			\$1,000,000

SEDIMENT DISPOSAL (Existing NR 500 Commercial Disposal Facility)

Capital Items	Quantity	Units	Cost
Solidification	1,009,840	ton	\$25,246,000
Lime Purchase	100,984	ton	\$6,059,040
Soil Loading	1,009,840	ton	\$2,827,552
Soil Hauling	1,009,840	ton	\$4,733,625
Tipping Fees (non-TSCA)	757,944	ton	\$32,591,604
Tipping Fees (TSCA)	251,896	ton	\$13,854,265
Direct Capital:			\$85,312,086
Engineering, Procurement & Construction Management:			10,237,450
Total Capital:			\$95,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

BAYPORT CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	2,178,000	cy	\$21,780,000
Seeding	2,178,000	sy	\$2,178,000
Mitigation	450	acre	\$4,500,000
Present Worth of Direct Capital:			\$2,766,749
Engineering, Procurement & Construction Management:			\$332,010
Total Capital:			\$3,098,759
Present Worth of Longer Term Operating Costs			
	Years	Annual Cost	
Mitigation	40	972	\$14,628
Long-term Monitoring	40	63,194	\$950,842
Long-term O&M	40	6,025	\$90,659
Total Present Worth, Longer Term O&M Costs			\$1,056,130
Total Project Capital and O&M Cost			\$4,200,000
TOTAL COST			\$234,400,000

Table 7-3 Cost Summary for Remedial Alternatives - Zone 2
500 ppb

Alternative	Dredge Volume (cy)	Mechanical Dredging	Water Treatment	CAD Construction	CDF Construction	Renard Island Closure	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
D	29,748,004	\$327,500,000	\$1,200,000	---	\$476,000,000	\$15,500,000	---	\$4,500,000	\$824,700,000	\$164,940,000	\$989,640,000
G	29,748,004	\$327,500,000	\$1,200,000	\$358,700,000	---	\$15,500,000	---	\$4,500,000	\$707,400,000	\$141,480,000	\$848,880,000

1000 ppb

Alternative	Dredge Volume (cy)	Mechanical Dredging	Water Treatment	CAD Construction	CDF Construction	Renard Island Closure	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
D	29,322,254	\$322,900,000	\$1,200,000	---	\$470,000,000	\$15,500,000	---	\$4,500,000	\$814,100,000	\$162,820,000	\$976,920,000
G	29,322,254	\$322,900,000	\$1,200,000	\$353,700,000	---	\$15,500,000	---	\$4,500,000	\$697,800,000	\$139,560,000	\$837,360,000

5000 ppb

Alternative	Dredge Volume (cy)	Mechanical Dredging	Water Treatment	CAD Construction	CDF Construction	Renard Island Closure	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C	4,070,170	\$48,700,000	\$700,000	---	---	\$15,500,000	\$437,800,000	\$4,500,000	\$507,200,000	\$101,440,000	\$608,640,000
D	4,070,170	\$48,700,000	\$700,000	---	\$97,100,000	\$15,500,000	---	\$4,500,000	\$166,500,000	\$33,300,000	\$199,800,000
G	4,070,170	\$48,700,000	\$700,000	\$54,600,000	---	\$15,500,000	---	\$4,500,000	\$124,000,000	\$24,800,000	\$148,800,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
Zone 2
Action Level - 500 ppb

Material Handling Assumptions:

Volume > 500 ppb	29,748,004	cy	22,708,400	m3
Volume > 1,000 ppb	29,322,254	cy	22,383,400	m3
Volume > 5,000 ppb	4,070,170	cy	3,107,000	m3
Solids Specific Gravity	2.36			
Fresh Water Density	62.4	lb/ft3		
In Situ Density	49.5%	w/w	29.3%	v/v
Slurry Density (20% in situ)	12.8%	w/w	5.9%	v/v
Dewatered Density (settling pond)	49.5%	w/w	29.3%	v/v
Treated Density	93.4%	w/w	60.0%	v/v
CDF Capacity	29,336,664	cy	22,394,400	m3
CAD Capacity	29,336,664	cy	22,394,400	m3

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%	
Sales Tax	5.5%	Not Used
Engineering, Procurement and Construction Mgmt	12.0%	
Contractor Overhead and Profit - Dredging Only	15.0%	

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day
Sediment Removal QA	\$1,200	per day

Mechanical - 12 cy bucket

Dock Construction	\$400,000	LS	Ogden Beeman
Mobilization - Equipment	\$315,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS	Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea	Ogden Beeman (JAG estimate)
Shift Rate (10 hours)	\$30,000	per shift	Ogden Beeman
Dredge Rate	4000	cy in situ per 10 hour shift	Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area	
Free Water per cy Dredged (10%)	20	gal	Ogden Beeman
Site Restoration	\$670,000	LS	

Nearshore CDF

Land Lease or Purchase	\$1.80	per sf	Ole
Length	20,948	lf	Baird
Capping Volume	3,880,174	cy	Baird
Area	34,921,570	sf	Baird
Ground Treatment Volume	117,777	cy	
Ground Treatment	\$25	per cy	
Dredge Volume	3,880,174	cy	
Fill Purchase/Placement	\$30	per cy	
Sheetpile Area	2,513,814	sf	Baird
Sheetpile Cost	\$19	per sf	Grant
Shot Rock Berm	\$650	per lf	Baird
Rip Rap	\$215	per lf	Baird
Place Treated Material	\$2	per cy	
Clean Soil Cap	\$10	per cy	Baird
Seeding	\$1	per sy	Baird
Mitigation	\$10,000	per acre	
	\$10,000	per year	Tim
Long-term Monitoring	\$650,000	per year	
Long-term O&M	2%	of capital	

CAD

Removal Volume	29,748,004	cy	
Area	50,199,757	sf	
Sand Cap Thickness	3	ft	
Mobilization/Site Prep	\$200,000		
Placement Rate	\$6	per cy	Ogden Beeman
Sand Purchase	\$6	per ton	Ole
Sand Density	1.4	tons per cy	
Cap Placement QA	\$100,000	LS	
Long-term O&M	2%	of capital	
Long-term Monitoring	\$400,000	per year	

Water Treatment

Flow Rate (7 dredges)	281	gpm	assume operate 24/7
Unit, Purchase	\$562,869	LS	pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons	pj
Water Treatment QA	\$200	per day	pj, 1 sample per day

Institutional Controls

Public Education Program	\$100,000		pj
O&M Plans	\$20,000		pj
Deed Restrictions	\$5,000		pj
<u>Annual Costs</u>			
Public Education Program	\$30,000		pj
Maintaining O&M Plans	\$800		pj
Reporting	\$20,000		pj
Long-term Monitoring	\$600,000		Anne LTM
Long-term Monitoring (no action)	\$300,000		Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000
TOTAL COST			\$9,900,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	7,437	Day	\$223,110,000
Dredge Monitoring (Water Quality)	7,437	Day	\$22,311,000
Sediment Removal QA	7,437	Day	\$8,924,400
Site Restoration	1	ea	\$670,000
Direct Capital:			\$257,865,400
Engineering, Procurement & Construction Management:			30,943,848
Contractor Overhead/Profit:			38,679,810
Total Capital:			\$327,500,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	281	gpm	\$562,869
Water Treatment (Includes Operator)	600,790,689	gal	\$240,316
Water Treatment QA	1,488	day	\$297,600
Direct Capital:			\$1,100,786
Engineering, Procurement & Construction Management:			132,094
Total Capital:			\$1,200,000

CDF CONSTRUCTION (Cellular Cofferdam Design)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	34,921,570	sf	\$62,858,826
Ground Treatment	117,777	cy	\$2,944,420
Dredging	3,695	day	\$21,063,804
Fill Purchase/Placement	3,880,174	cy	\$116,405,233
Shot Rock/Rip Rap	20,948	lf	\$18,120,406
Sheetpile Placement	2,513,814	sf	\$47,762,457
Clean Soil Cap	3,880,174	cy	\$38,801,744
Seeding	3,880,174	sy	\$3,880,174
Mitigation	802	acre	\$8,016,889

Direct Capital: \$319,853,954

Engineering, Procurement & Construction Management: \$38,382,475

Total Capital: \$358,236,429

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	7,164,729	\$107,802,633

Total Present Worth, Longer Term O&M Costs \$117,733,189

Total Project Capital and O&M Cost \$476,000,000

RENARD ISLAND CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	290,400	cy	\$2,904,000
Seeding	290,400	sy	\$290,400
Mitigation	60	acre	\$600,000

Direct Capital: \$3,794,400

Engineering, Procurement & Construction Management: \$455,328

Total Capital: \$4,249,728

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	84,995	\$1,278,853

Total Present Worth, Longer Term O&M Costs \$11,209,409

Total Project Capital and O&M Cost \$15,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000

Direct Capital: \$5,000

Engineering, Procurement & Construction Management: 600

Total Capital: \$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889

Total Present Worth, Longer Term O&M Costs \$4,513,889

Total Project Capital and O&M Cost \$4,500,000

TOTAL COST \$824,700,000

ALTERNATIVE G: Dredge Sediment to CAD**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	7,437	Day	\$223,110,000
Dredge Monitoring (Water Quality)	7,437	Day	\$22,311,000
Sediment Removal QA	7,437	Day	\$8,924,400
Site Restoration	1	ea	\$670,000
Direct Capital:			\$257,865,400
Engineering, Procurement & Construction Management:			30,943,848
Contractor Overhead/Profit:			38,679,810
Total Capital:			\$327,500,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	281	gpm	\$562,869
Water Treatment (Includes Operator)	600,790,689	gal	\$240,316
Water Treatment QA	1,488	day	\$297,600
Direct Capital:			\$1,100,786
Engineering, Procurement & Construction Management:			132,094
Total Capital:			\$1,200,000

CAD CONSTRUCTION

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Dredging - 12 hour shifts	28,332	Day	\$161,492,400
Sand Purchase	7,808,851	tons	\$46,853,106
Placement	5,577,751	cy	\$33,466,505
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$242,082,011
Engineering, Procurement & Construction Management:			29,049,841
Total Capital:			\$271,131,852

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$5,422,637	\$81,590,607
Total Present Worth, Longer Term O&M Costs			\$87,609,126
Total Project Capital and O&M Cost			\$358,700,000

RENARD ISLAND CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	290,400	cy	\$2,904,000
Seeding	290,400	sy	\$290,400
Mitigation	60	acre	\$600,000
Direct Capital:			\$3,794,400
Engineering, Procurement & Construction Management:			\$455,328
Total Capital:			\$4,249,728
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	84,995	\$1,278,853
Total Present Worth, Longer Term O&M Costs			\$11,209,409
Total Project Capital and O&M Cost			\$15,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
			<hr/>
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
			<hr/>
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$707,400,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
Zone 2
Action Level - 1,000 ppb

Material Handling Assumptions:

Volume > 1,000 ppb	29,322,254	cy	22,383,400	m3
Volume > 500 ppb	29,748,004	cy	22,708,400	m3
Volume > 5,000 ppb	4,070,170	cy	3,107,000	m3
Solids Specific Gravity	2.36			
Fresh Water Density	62.4	lb/ft3		
In Situ Density	49.5%	w/w	29.3%	v/v
Slurry Density (20% in situ)	12.8%	w/w	5.9%	v/v
Dewatered Density (settling pond)	49.5%	w/w	29.3%	v/v
Treated Density	93.4%	w/w	60.0%	v/v
CDF Capacity	26,394,060	cy	22,394,400	m3
CAD Capacity	29,336,664	cy	22,394,400	m3

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%	
Sales Tax	5.5%	Not Used
Engineering, Procurement and Construction Mgmt	12.0%	
Contractor Overhead and Profit - Dredging Only	15.0%	

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day
Sediment Removal QA	\$1,200	per day

Mechanical - 12 cy bucket

Dock Construction	\$400,000	LS	Ogden Beeman
Mobilization - Equipment	\$315,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS	Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea	Ogden Beeman (JAG estimate)
Shift Rate (10 hours)	\$30,000	per shift	Ogden Beeman
Dredge Rate	4000	cy in situ per 10 hour shift	Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area	
Free Water per cy Dredged (10%)	20	gal	Ogden Beeman
Site Restoration	\$670,000	LS	

Nearshore CDF

Land Lease or Purchase	\$1.80	per sf	Ole
Length	20,798	lf	Baird
Capping Volume	3,824,642	cy	290,400
Area	34,421,776	sf	2,613,600
Ground Treatment Volume	116,931	cy	
Ground Treatment	\$25	per cy	
Dredge Volume	3,824,642	cy	
Fill Purchase/Placement	\$30	per cy	
Sheetpile Area	2,495,760	sf	Baird
Sheetpile Cost	\$19	per sf	Grant
Shot Rock Berm	\$650	per lf	Baird
Rip Rap	\$215	per lf	Baird
Place Treated Material	\$2	per cy	
Clean Soil Cap	\$10	per cy	Baird
Seeding	\$1	per sy	Baird
Mitigation	\$10,000	per acre	
	\$10,000	per year	Tim
Long-term Monitoring	\$650,000	per year	
Long-term O&M	2%	of capital	

CAD

Removal Volume	29,322,254	cy	
Area	49,481,304	sf	
Sand Cap Thickness	3	ft	
Mobilization/Site Prep	\$200,000		
Placement Rate	\$6	per cy	Ogden Beeman
Sand Purchase	\$6	per ton	Ole
Sand Density	1.4	tons per cy	
Cap Placement QA	\$100,000	LS	
Long-term O&M	2%	of capital	
Long-term Monitoring	\$400,000	per year	

Water Treatment

Flow Rate (7 dredges)	281	gpm	assume operate 24/7
Unit, Purchase	\$562,869	LS	pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons	pj
Water Treatment QA	\$200	per day	pj, 1 sample per day

Institutional Controls

Public Education Program	\$100,000		pj
O&M Plans	\$20,000		pj
Deed Restrictions	\$5,000		pj
<u>Annual Costs</u>			
Public Education Program	\$30,000		pj
Maintaining O&M Plans	\$800		pj
Reporting	\$20,000		pj
Long-term Monitoring	\$600,000		Anne LTM
Long-term Monitoring (no action)	\$300,000		Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000
TOTAL COST			\$9,900,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	7,331	Day	\$219,930,000
Dredge Monitoring (Water Quality)	7,331	Day	\$21,993,000
Sediment Removal QA	7,331	Day	\$8,797,200
Site Restoration	1	ea	\$670,000
Direct Capital:			\$254,240,200
Engineering, Procurement & Construction Management:			30,508,824
Contractor Overhead/Profit:			38,136,030
Total Capital:			\$322,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	281	gpm	\$562,869
Water Treatment (Includes Operator)	592,192,242	gal	\$236,877
Water Treatment QA	1,467	day	\$293,400
Direct Capital:			\$1,093,146
Engineering, Procurement & Construction Management:			131,178
Total Capital:			\$1,200,000

CDF CONSTRUCTION (Cellular Cofferdam Design)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	34,421,776	sf	\$61,959,198
Ground Treatment	116,931	cy	\$2,923,274
Dredging	3,643	day	\$20,762,341
Fill Purchase/Placement	3,824,642	cy	\$114,739,255
Shot Rock/Rip Rap	20,798	lf	\$17,990,270
Sheetpile Placement	2,495,760	sf	\$47,419,440
Clean Soil Cap	3,824,642	cy	\$38,246,418
Seeding	3,824,642	sy	\$3,824,642
Mitigation	790	acre	\$7,902,153

Direct Capital: \$315,766,990

Engineering, Procurement & Construction Management: \$37,892,039

Total Capital: \$353,659,029

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	7,073,181	\$106,425,175

Total Present Worth, Longer Term O&M Costs **\$116,355,731**

Total Project Capital and O&M Cost \$470,000,000

RENARD ISLAND CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	290,400	cy	\$2,904,000
Seeding	290,400	sy	\$290,400
Mitigation	60	acre	\$600,000

Direct Capital: \$3,794,400

Engineering, Procurement & Construction Management: \$455,328

Total Capital: \$4,249,728

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	84,995	\$1,278,853

Total Present Worth, Longer Term O&M Costs **\$11,209,409**

Total Project Capital and O&M Cost \$15,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000

Direct Capital: \$5,000

Engineering, Procurement & Construction Management: 600

Total Capital: \$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889

Total Present Worth, Longer Term O&M Costs **\$4,513,889**

Total Project Capital and O&M Cost \$4,500,000

TOTAL COST \$814,100,000

ALTERNATIVE G: Dredge Sediment to CAD**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	7,331	Day	\$219,930,000
Dredge Monitoring (Water Quality)	7,331	Day	\$21,993,000
Sediment Removal QA	7,331	Day	\$8,797,200
Site Restoration	1	ea	\$670,000
Direct Capital:			\$254,240,200
Engineering, Procurement & Construction Management:			30,508,824
Contractor Overhead/Profit:			38,136,030
Total Capital:			\$322,900,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	281	gpm	\$562,869
Water Treatment (Includes Operator)	592,192,242	gal	\$236,877
Water Treatment QA	1,467	day	\$293,400
Direct Capital:			\$1,093,146
Engineering, Procurement & Construction Management:			131,178
Total Capital:			\$1,200,000

CAD CONSTRUCTION

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Dredging - 12 hour shifts	27,926	Day	\$159,178,200
Sand Purchase	7,697,092	tons	\$46,182,550
Placement	5,497,923	cy	\$32,987,536
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$238,618,286
Engineering, Procurement & Construction Management:			28,634,194
Total Capital:			\$267,252,480

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$5,345,050	\$80,423,203
Total Present Worth, Longer Term O&M Costs			\$86,441,722
Total Project Capital and O&M Cost			\$353,700,000

RENARD ISLAND CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	290,400	cy	\$2,904,000
Seeding	290,400	sy	\$290,400
Mitigation	60	acre	\$600,000
Direct Capital:			\$3,794,400
Engineering, Procurement & Construction Management:			\$455,328
Total Capital:			\$4,249,728
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	84,995	\$1,278,853
Total Present Worth, Longer Term O&M Costs			\$11,209,409
Total Project Capital and O&M Cost			\$15,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
			<hr/>
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	<hr/>
			\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$697,800,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
Zone 2
Action Level - 5,000 ppb

Material Handling Assumptions:

Volume > 5,000 ppb	4,070,170	cy		3,107,000	m3
Volume > 500 ppb	29,322,254	cy		22,383,400	m3
Volume > 1,000 ppb	29,748,004	cy		22,708,400	m3
Solids Specific Gravity	2.36				
Fresh Water Density	62.4	lb/ft3			
In Situ Density	49.5%	w/w	29.3%	v/v	1.18 tons per cy
Slurry Density (20% in situ)	12.8%	w/w	5.9%	v/v	0.91 tons per cy
Dewatered Density (settling pond)	49.5%	w/w	29.3%	v/v	1.18 tons per cy
Treated Density	93.4%	w/w	60.0%	v/v	1.28 tons per cy
CDF Capacity	26,394,060	cy		22,394,400	m3
CAD Capacity	29,336,664	cy		22,394,400	m3

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%		
Sales Tax	5.5%		Not Used
Engineering, Procurement and Construction Mgmt	12.0%		
Contractor Overhead and Profit - Dredging Only	15.0%		

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day	
Sediment Removal QA	\$1,200	per day	
Mechanical - 12 cy bucket			
Dock Construction	\$400,000	LS	
Mobilization - Equipment	\$315,000	per dredge	
Mobilization - Silt Curtain	\$35,000	LS	
Mobilization - Watertight Barge	\$100,000	ea	
Shift Rate (10 hours)	\$30,000	per shift	
Dredge Rate	4000	cy in situ per 10 hour shift	
Offload Stockpile Area Prep.	\$75,000	per area	
Free Water per cy Dredged (10%)	20	gal	
Site Restoration	\$670,000	LS	

Ogden Beeman
Ogden Beeman
Ogden Beeman
Ogden Beeman (JAG estimate)
Ogden Beeman
Ogden Beeman
Ogden Beeman

Nearshore CDF

Land Lease or Purchase	\$1.80	per sf		
Length	7,749	lf		
Capping Volume	530,892	cy	290,400	
Area	4,778,026	sf	2,613,600	
Ground Treatment Volume	43,565	cy		
Ground Treatment	\$25	per cy		
Dredge Volume	530,892	cy		
Fill Purchase/Placement	\$30	per cy		
Sheetpile Area	929,845	sf		
Sheetpile Cost	\$19	per sf		
Shot Rock Berm	\$650	per lf		
Rip Rap	\$215	per lf		
Place Treated Material	\$2	per cy		
Clean Soil Cap	\$10	per cy		
Seeding	\$1	per sy		
Mitigation	\$10,000	per acre		
	\$10,000	per year		
Long-term Monitoring	\$650,000	per year		
Long-term O&M	2%	of capital		

Renard Island

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Solidification

Percent Lime	10.0%	(w/w)		
Lime	\$60	per ton	Mixing	\$25 per ton

Ole

CAD

Removal Volume	4,070,170	cy	
Area	6,868,412	sf	
Sand Cap Thickness	3	ft	
Mobilization/Site Prep	\$200,000		
Placement Rate	\$6	per cy	
Sand Purchase	\$6	per ton	
Sand Density	1.4	tons per cy	
Cap Placement QA	\$100,000	LS	
Long-term O&M	2%	of capital	
Long-term Monitoring	\$400,000	per year	

Ogden Beeman
Ole

Water Treatment

Flow Rate (7 dredges)	281	gpm	
Unit, Purchase	\$562,869	LS	
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons	
Water Treatment QA	\$200	per day	

assume operate 24/7
pj
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pj, 1 sample per day

Disposal

Off-Site Disposal

Load Soil for Hauling	\$2.80	per ton
Round-trip Hauling	2	hours
Tipping Fee (non-TSCA)	\$43	per ton
Tipping Fee (TSCA)	\$55	per ton
Truck Rate	\$75	per hour
Truck Load	32	tons

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St. Paul
St. Paul
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Institutional Controls

Public Education Program	\$100,000
O&M Plans	\$20,000
Deed Restrictions	\$5,000

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Annual Costs

Public Education Program	\$30,000
Maintaining O&M Plans	\$800
Reporting	\$20,000
Long-term Monitoring	\$600,000
Long-term Monitoring (no action)	\$300,000

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ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000
TOTAL COST			\$9,900,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	1,018	Day	\$30,540,000
Dredge Monitoring (Water Quality)	1,018	Day	\$3,054,000
Sediment Removal QA	1,018	Day	\$1,221,600
Site Restoration	1	ea	\$670,000
Direct Capital:			\$38,335,600
Engineering, Procurement & Construction Management:			4,600,272
Contractor Overhead/Profit:			5,750,340
Total Capital:			\$48,700,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	281	gpm	\$562,869
Water Treatment (Includes Operator)	82,201,153	gal	\$32,880
Water Treatment QA	204	day	\$40,800
Direct Capital:			\$636,550
Engineering, Procurement & Construction Management:			76,386
Total Capital:			\$700,000

CDF CONSTRUCTION (Cellular Cofferdam Design)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	4,778,026	sf	\$8,600,446
Ground Treatment	43,565	cy	\$1,089,124
Dredging	506	day	\$2,881,984
Fill Purchase/Placement	530,892	cy	\$15,926,752
Shot Rock/Rip Rap	7,749	lf	\$6,702,630
Sheetpile Placement	929,845	sf	\$17,667,049
Clean Soil Cap	530,892	cy	\$5,308,917
Seeding	530,892	sy	\$530,892
Mitigation	110	acre	\$1,096,884
Direct Capital:			\$59,804,678
Engineering, Procurement & Construction Management:			\$7,176,561
Total Capital:			\$66,981,240

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	1,339,625	\$20,156,392
Total Present Worth, Longer Term O&M Costs			\$30,086,948
Total Project Capital and O&M Cost			\$97,100,000

RENARD ISLAND CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	290,400	cy	\$2,904,000
Seeding	290,400	sy	\$290,400
Mitigation	60	acre	\$600,000
Direct Capital:			\$3,794,400
Engineering, Procurement & Construction Management:			\$455,328
Total Capital:			\$4,249,728

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	84,995	\$1,278,853
Total Present Worth, Longer Term O&M Costs			\$11,209,409
Total Project Capital and O&M Cost			\$15,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$166,500,000

ALTERNATIVE G: Dredge Sediment to CAD

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	1,018	Day	\$30,540,000
Dredge Monitoring (Water Quality)	1,018	Day	\$3,054,000
Sediment Removal QA	1,018	Day	\$1,221,600
Site Restoration	1	ea	\$670,000
Direct Capital:			\$38,335,600
Engineering, Procurement & Construction Management:			4,600,272
Contractor Overhead/Profit:			5,750,340
Total Capital:			\$48,700,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	281	gpm	\$562,869
Water Treatment (Includes Operator)	82,201,153	gal	\$32,880
Water Treatment QA	204	day	\$40,800
Direct Capital:			\$636,550
Engineering, Procurement & Construction Management:			76,386
Total Capital:			\$700,000

CAD CONSTRUCTION

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Dredging - 12 hour shifts	3,877	Day	\$22,098,900
Sand Purchase	1,068,420	tons	\$6,410,518
Placement	763,157	cy	\$4,578,941
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$33,358,359
Engineering, Procurement & Construction Management:			4,003,003
Total Capital:			\$37,361,362
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$747,227	\$11,243,003
Total Present Worth, Longer Term O&M Costs			\$17,261,522
Total Project Capital and O&M Cost			\$54,600,000

RENARD ISLAND CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	290,400	cy	\$2,904,000
Seeding	290,400	sy	\$290,400
Mitigation	60	acre	\$600,000
Direct Capital:			\$3,794,400
Engineering, Procurement & Construction Management:			\$455,328
Total Capital:			\$4,249,728
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	84,995	\$1,278,853
Total Present Worth, Longer Term O&M Costs			\$11,209,409
Total Project Capital and O&M Cost			\$15,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$124,000,000

ALTERNATIVE C: Dredge and Off-site Disposal

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	1,018	Day	\$30,540,000
Dredge Monitoring (Water Quality)	1,018	Day	\$3,054,000
Sediment Removal QA	1,018	Day	\$1,221,600
Site Restoration	1	ea	\$670,000
Direct Capital:			\$38,335,600
Engineering, Procurement & Construction Management:			4,600,272
Contractor Overhead/Profit:			5,750,340
Total Capital:			\$48,700,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	281	gpm	\$562,869
Water Treatment (Includes Operator)	82,201,153	gal	\$32,880
Water Treatment QA	204	day	\$40,800
Direct Capital:			\$636,550
Engineering, Procurement & Construction Management:			76,386
Total Capital:			\$700,000

SEDIMENT DISPOSAL (OFF-SITE)

Capital Items	Quantity	Units	Cost
Solidification	4,797,107	ton	\$119,927,675
Lime Purchase	479,711	ton	\$28,782,660
Soil Loading	4,797,107	ton	\$13,431,900
Soil Hauling	4,797,107	ton	\$22,486,439
Tipping Fees (non-TSCA)	4,797,107	ton	\$206,275,594
Direct Capital:			\$390,904,268
Engineering, Procurement & Construction Management:			46,908,512
Total Capital:			\$437,800,000

RENARD ISLAND CLOSURE

Capital Items	Quantity	Units	Cost
Clean Soil Cap	290,400	cy	\$2,904,000
Seeding	290,400	sy	\$290,400
Mitigation	60	acre	\$600,000
Direct Capital:			\$3,794,400
Engineering, Procurement & Construction Management:			\$455,328
Total Capital:			\$4,249,728
Present Worth of Longer Term Operating Costs		Years	Annual Cost
Mitigation		40	10,000
			\$150,463
Long-term Monitoring		40	650,000
			\$9,780,093
Long-term O&M		40	84,995
			\$1,278,853
Total Present Worth, Longer Term O&M Costs			\$11,209,409
Total Project Capital and O&M Cost			\$15,500,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs		Years	Annual Cost
Long-term Monitoring (no action)		40	\$300,000
			\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$507,200,000

Table 7-3 Cost Summary for Remedial Alternatives - Zone 3A
500 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Dewatering	Water Treatment	CAD Construction	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
D	16,328,102	---	\$181,800,000	---	\$3,000,000	---	\$285,000,000	---	\$4,500,000	\$474,300,000	\$94,860,000	\$569,160,000
G	16,328,102	---	\$181,800,000	---	\$3,000,000	\$199,800,000	---	---	\$4,500,000	\$389,100,000	\$77,820,000	\$466,920,000

1000 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Dewatering	Water Treatment	CAD Construction	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
C	14,410	---	\$4,600,000	---	\$600,000	---	---	\$1,300,000	\$4,500,000	\$11,000,000	\$2,200,000	\$13,200,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
Zone 3A
Action Level - 500 ppb

Material Handling Assumptions:

Volume > 500 ppb	16,328,102	cy		12,464,200	m3
Volume > 1,000 ppb	14,410	cy		11,000	m3
Volume > 5,000 ppb	0	cy		0	m3
Solids Specific Gravity	2.36				
Fresh Water Density	62.4	lb/ft3			
In Situ Density	28.5%	w/w	14.4% v/v	1.01	tons per cy
Slurry Density (20% in situ)	6.5%	w/w	2.9% v/v	0.88	tons per cy
Dewatered Density	50.0%	w/w	29.8% v/v	1.18	tons per cy
Treated Density	93.4%	w/w	60.0% v/v	1.28	tons per cy
CDF Capacity	26,500,893	cy		22,394,400	m3
CAD Capacity	29,336,664	cy		22,394,400	m3

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%	
Sales Tax	5.5%	Not Used
Engineering, Procurement and Construction Mgmt	12.0%	
Contractor Overhead and Profit - Dredging Only	15.0%	

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day
Sediment Removal QA	\$1,200	per day
Mechanical - 12 cy bucket		
Dock Construction	\$400,000	LS
Mobilization - Equipment	\$315,000	per dredge
Mobilization - Silt Curtain	\$35,000	LS
Mobilization - Watertight Barge	\$100,000	ea
Shift Rate (10 hours)	\$30,000	per shift
Dredge Rate	4000	cy in situ per 10 hour shift
Offload Stockpile Area Prep.	\$75,000	per area
Free Water per cy Dredged (10%)	20	gal
Site Restoration	\$670,000	LS

Ogden Beeman
Ogden Beeman
Ogden Beeman
Ogden Beeman (JAG estimate)
Ogden Beeman
Ogden Beeman
Ogden Beeman

Nearshore CDF

Land Lease or Purchase	\$1.80	per sf
Length	15,520	lf
Capping Volume	2,129,752	cy
Area	19,167,772	sy
Ground Treatment Volume	87,257	cy
Ground Treatment	\$25	per cy
Dredge Volume	2,129,752	cy
Fill Purchase/Placement	\$30	per cy
Sheetpile Area	1,862,396	sf
Sheetpile Cost	\$19	per sf
Shot Rock Berm	\$650	per lf
Rip Rap	\$215	per lf
Place Treated Material	\$2	per cy
Clean Soil Cap	\$10	per cy
Seeding	\$1	per sy
Mitigation	\$10,000	per acre
	\$10,000	per year
Long-term Monitoring	\$650,000	per year
Long-term O&M	2%	of capital

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CAD

Removal Volume	16,328,102	cy
Area	27,553,672	sf
Sand Cap Thickness	3	ft
Mobilization/Site Prep	\$200,000	
Placement Rate	\$6	per cy
Sand Purchase	\$6	per ton
Sand Density	1.4	tons per cy
Cap Placement QA	\$100,000	LS
Long-term O&M	2%	of capital
Long-term Monitoring	\$400,000	per year

Ogden Beeman
Ole

Water Treatment

Flow Rate (7 dredges)	1,727	gpm
Unit, Purchase	\$1,674,760	LS
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons
Water Treatment QA	\$200	per day

assume operate 24/7
pj
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pj, 1 sample per day

Institutional Controls

Public Education Program	\$100,000	
O&M Plans	\$20,000	
Deed Restrictions	\$5,000	
<u>Annual Costs</u>		
Public Education Program	\$30,000	
Maintaining O&M Plans	\$800	
Reporting	\$20,000	
Long-term Monitoring	\$600,000	
Long-term Monitoring (no action)	\$300,000	

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Anne LTM
Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	4,083	Day	31.40769231 \$122,490,000
Dredge Monitoring (Water Quality)	4,083	Day	\$12,249,000
Sediment Removal QA	4,083	Day	\$4,899,600
Site Restoration	1	ea	\$670,000
Direct Capital:			\$143,158,600
Engineering, Procurement & Construction Management:			17,179,032
Contractor Overhead/Profit:			21,473,790
Total Capital:			\$181,800,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	1,727	gpm	\$1,674,760
Water Treatment (Includes Operator)	2,029,749,525	gal	\$811,900
Water Treatment QA	817	day	\$163,400
Direct Capital:			\$2,650,060
Engineering, Procurement & Construction Management:			318,007
Total Capital:			\$3,000,000

CDF CONSTRUCTION (Cellular Cofferdam Design)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	19,167,772	sf	\$34,501,989
Ground Treatment	87,257	cy	\$2,181,417
Dredging	2,028	day	\$11,561,513
Fill Purchase/Placement	2,129,752	cy	\$63,892,573
Shot Rock/Rip Rap	15,520	lf	\$13,424,770
Sheetpile Placement	1,862,396	sf	\$35,385,521
Clean Soil Cap	2,129,752	cy	\$21,297,524
Seeding	2,129,752	sy	\$2,129,752
Mitigation	440	acre	\$4,400,315

Direct Capital: \$188,775,376

Engineering, Procurement & Construction Management: \$22,653,045

Total Capital: \$211,428,421

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	4,228,568	\$63,624,296

Total Present Worth, Longer Term O&M Costs **\$73,554,852**

Total Project Capital and O&M Cost \$285,000,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000

Direct Capital: \$5,000

Engineering, Procurement & Construction Management: 600

Total Capital: \$5,600

Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889

Total Present Worth, Longer Term O&M Costs **\$4,513,889**

Total Project Capital and O&M Cost \$4,500,000

TOTAL COST \$474,300,000

ALTERNATIVE G: Dredge Sediment to CAD

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	4,083	Day	\$122,490,000
Dredge Monitoring (Water Quality)	4,083	Day	\$12,249,000
Sediment Removal QA	4,083	Day	\$4,899,600
Site Restoration	1	ea	\$670,000

Direct Capital: \$143,158,600

Engineering, Procurement & Construction Management: 17,179,032

Contractor Overhead/Profit: 21,473,790

Total Capital: \$181,800,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	1,727	gpm	\$1,674,760
Water Treatment (Includes Operator)	2,029,749,525	gal	\$811,900
Water Treatment QA	817	day	\$163,400

Direct Capital: \$2,650,060

Engineering, Procurement & Construction Management: 318,007

Total Capital: \$3,000,000

CAD CONSTRUCTION

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Dredging - 12 hour shifts	15,551	Day	\$88,640,700
Sand Purchase	4,286,127	tons	\$25,716,761
Placement	3,061,519	cy	\$18,369,115
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$132,996,575
Engineering, Procurement & Construction Management:			15,959,589
Total Capital:			\$148,956,164
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$2,979,123	\$44,824,773
Total Present Worth, Longer Term O&M Costs			\$50,843,292
Total Project Capital and O&M Cost			\$199,800,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$389,100,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
Zone 3A
Action Level - 1,000 ppb

Material Handling Assumptions:

Volume > 1,000 ppb	14,410	cy	11,000	m3
Volume > 500 ppb	16,328,102	cy	12,464,200	m3
Volume > 5,000 ppb	0	cy	0	m3
Solids Specific Gravity	2.36			
Fresh Water Density	62.4	lb/ft3		
In Situ Density	28.5%	w/w	14.4%	v/v
Slurry Density (20% in situ)	6.5%	w/w	2.9%	v/v
Dewatered Density	28.5%	w/w	14.4%	v/v
Treated Density	93.4%	w/w	60.0%	v/v
			1.01	tons per cy
			0.88	tons per cy
			1.01	tons per cy
			1.28	tons per cy

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%	
Sales Tax	5.5%	Not Used
Engineering, Procurement and Construction Mgmt	12.0%	
Contractor Overhead and Profit - Dredging Only	15.0%	

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day	
Sediment Removal QA	\$1,200	per day	
Mechanical - 12 cy bucket			
Dock Construction	\$400,000	LS	Ogden Beeman
Mobilization - Equipment	\$315,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS	Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea	Ogden Beeman (JAG estimate)
Shift Rate (10 hours)	\$30,000	per shift	Ogden Beeman
Dredge Rate	4000	cy in situ per 10 hour shift	Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area	
Free Water per cy Dredged (10%)	20	gal	Ogden Beeman
Site Restoration	\$670,000	LS	

Solidification

Percent Lime	10.0%	(w/w)	
Lime	\$60	per ton	Mixing
			\$25 per ton

Water Treatment

Flow Rate	286	gpm	assume operate 24/7
Unit, Purchase	\$569,927	LS	pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons	pj
Water Treatment QA	\$200	per day	pj, 1 sample per day

Disposal

Off-Site Disposal

Load Soil for Hauling	\$2.80	per ton
Round-trip Hauling	2	hours
Tipping Fee (non-TSCA)	\$43	per ton
Tipping Fee (TSCA)	\$55	per ton
Truck Rate	\$75	per hour
Truck Load	32	tons

Institutional Controls

Public Education Program	\$100,000	pj
O&M Plans	\$20,000	pj
Deed Restrictions	\$5,000	pj
<u>Annual Costs</u>		
Public Education Program	\$30,000	pj
Maintaining O&M Plans	\$800	pj
Reporting	\$20,000	pj
Long-term Monitoring	\$600,000	Anne LTM
Long-term Monitoring (no action)	\$300,000	Anne LTM

ALTERNATIVE A: No Action

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE C: Dredge and Off-site Disposal**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	4	Day	\$120,000
Dredge Monitoring (Water Quality)	4	Day	\$12,000
Sediment Removal QA	4	Day	\$4,800
Site Restoration	1	ea	\$670,000
Direct Capital:			\$3,656,800
Engineering, Procurement & Construction Management:			438,816
Contractor Overhead/Profit:			548,520
Total Capital:			\$4,600,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit Purchase	286	gpm	\$569,927
Water Treatment (Includes Operator)	297,131	gal	\$119
Water Treatment QA	1	day	\$200
Direct Capital:			\$570,246
Engineering, Procurement & Construction Management:			68,429
Total Capital:			\$600,000

SEDIMENT DISPOSAL (OFF-SITE)

Capital Items	Quantity	Units	Cost
Solidification	14,494	ton	\$362,350
Lime Purchase	1,450	ton	\$87,000
Soil Loading	14,494	ton	\$40,583
Soil Hauling	14,494	ton	\$67,941
Tipping Fees (non-TSCA)	14,494	ton	\$623,239
Direct Capital:			\$1,181,113
Engineering, Procurement & Construction Management:			141,734
Total Capital:			\$1,300,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$11,000,000

Table 7-3 Cost Summary for Remedial Alternatives - Zone 3E
500 ppb

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Dewatering	Water Treatment	CAD Construction	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000
D	43,625,096	---	\$478,200,000	---	\$4,700,000	---	\$667,700,000	---	\$4,500,000	\$1,155,100,000	\$231,020,000	\$1,386,120,000
G	43,625,096	---	\$478,600,000	---	\$4,700,000	\$523,100,000	---	---	\$4,500,000	\$1,010,900,000	\$202,180,000	\$1,213,080,000

BASIS FOR PRELIMINARY COST ESTIMATES
SEDIMENT REMEDIATION
FOX RIVER, WISCONSIN
Zone 3B
Action Level - 500 ppb

Material Handling Assumptions:

Volume > 500 ppb	43,625,096	cy	33,301,600	m3
Volume > 1,000 ppb	0	cy	0	m3
Volume > 5,000 ppb	0	cy	0	m3
Solids Specific Gravity	2.36			
Fresh Water Density	62.4	lb/ft3		
In Situ Density	28.4%	w/w	14.4%	v/v
Slurry Density (20% in situ)	6.5%	w/w	2.9%	v/v
Dewatered Density	50.0%	w/w	29.8%	v/v
Treated Density	93.4%	w/w	60.0%	v/v
CDF Capacity	26,500,893	cy	22,394,400	m3
CAD Capacity	29,336,664	cy	22,394,400	m3

Cost Estimating Parameters & Methodology:

Interest Rate	6.0%	
Sales Tax	5.5%	Not Used
Engineering, Procurement and Construction Mgmt	12.0%	
Contractor Overhead and Profit - Dredging Only	15.0%	

Dredging

Dredge Monitoring (Water Quality)	\$3,000	per day
Sediment Removal QA	\$1,200	per day

Mechanical - 7 dredges

Dock Construction	\$400,000	LS	Ogden Beeman
Mobilization - Equipment	\$315,000	per dredge	Ogden Beeman
Mobilization - Silt Curtain	\$35,000	LS	Ogden Beeman
Mobilization - Watertight Barge	\$100,000	ea	Ogden Beeman (JAG estimate)
Shift Rate (10 hours)	\$30,000	per shift	Ogden Beeman
Dredge Rate	4000	cy in situ per 10 hour shift	Ogden Beeman
Offload Stockpile Area Prep.	\$75,000	per area	
Free Water per cy Dredged (10%)	20	gal	Ogden Beeman
Site Restoration	\$670,000	LS	

Nearshore CDF

Land Lease or Purchase	\$1.80	per sf	Ole
Length	25,368	lf	Baird
Capping Volume	5,690,230	cy	Baird
Area	51,212,069	sy	Baird
Ground Treatment Volume	142,626	cy	
Ground Treatment	\$25	per cy	
Dredge Volume	5,690,230	cy	
Fill Purchase/Placement	\$30	per cy	
Sheetpile Area	3,044,194	sf	Baird
Sheetpile Cost	\$19	per sf	Grant
Shot Rock Berm	\$650	per lf	Baird
Rip Rap	\$215	per lf	Baird
Place Treated Material	\$2	per cy	
Clean Soil Cap	\$10	per cy	Baird
Seeding	\$1	per sy	Baird
Mitigation	\$10,000	per acre	
	\$10,000	per year	Tim
Long-term Monitoring	\$650,000	per year	
Long-term O&M	2%	of capital	

CAD

Removal Volume	43,625,096	cy	
Area	73,617,350	sf	
Sand Cap Thickness	3	ft	
Mobilization/Site Prep	\$200,000		
Placement Rate	\$6	per cy	Ogden Beeman
Sand Purchase	\$6	per ton	Ole
Sand Density	1.4	tons per cy	
Cap Placement QA	\$100,000	LS	
Long-term O&M	2%	of capital	
Long-term Monitoring	\$400,000	per year	

Water Treatment

Flow Rate (7 dredges)	1,729	gpm	assume operate 24/7
Unit, Purchase	\$1,676,421	LS	pj
Water Treatment (Including Operator)	\$0.40	per 1,000 gallons	pj
Water Treatment QA	\$200	per day	pj, 1 sample per day

Institutional Controls

Public Education Program	\$100,000		pj
O&M Plans	\$20,000		pj
Deed Restrictions	\$5,000		pj
<u>Annual Costs</u>			
Public Education Program	\$30,000		pj
Maintaining O&M Plans	\$800		pj
Reporting	\$20,000		pj
Long-term Monitoring	\$600,000		Anne LTM
Long-term Monitoring (no action)	\$300,000		Anne LTM

ALTERNATIVE A: No Action**INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000

ALTERNATIVE B: Monitored Natural Recovery**MONITORING/INSTITUTIONAL CONTROLS**

Capital Items	Quantity	Units	Cost
Public Education Program	1	LS	\$100,000
O&M Plans	1	LS	\$20,000
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$125,000
Engineering, Procurement & Construction Management:			15,000
Total Capital:			\$140,000
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring	40	\$600,000	\$9,027,778
Public Education Program	40	\$30,000	\$451,389
Maintaining O&M Plans	40	\$800	\$12,037
Reporting	40	\$20,000	\$300,926
Total Present Worth, Longer Term O&M Costs			\$9,792,130
Total Project Capital and O&M Cost			\$9,900,000

ALTERNATIVE D: Dredge Sediment to CDF**SEDIMENT REMOVAL (MECHANICAL DREDGING)**

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	7	LS	\$2,450,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	10,907	Day	83.9 \$327,210,000
Dredge Monitoring (Water Quality)	10,907	Day	\$32,721,000
Sediment Removal QA	10,907	Day	\$13,088,400
Site Restoration	1	ea	\$670,000
Direct Capital:			\$376,539,400
Engineering, Procurement & Construction Management:			45,184,728
Contractor Overhead/Profit:			56,480,910
Total Capital:			\$478,200,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
Unit, Purchase	1,729	LS	\$1,676,421
Water Treatment (Includes Operator)	5,432,013,966	gal	\$2,172,806
Water Treatment QA	1,909	day	\$381,800
Direct Capital:			\$4,231,027
Engineering, Procurement & Construction Management:			507,723
Total Capital:			\$4,700,000

CDF CONSTRUCTION (Cellular Cofferdam Design)

Capital Items	Quantity	Units	Cost
Land Lease or Purchase	51,212,069	sf	\$92,181,725
Ground Treatment	142,626	cy	\$3,565,653
Dredging	5,419	day	\$30,889,820
Fill Purchase/Placement	5,690,230	cy	\$170,706,897
Shot Rock/Rip Rap	25,368	lf	\$21,943,566
Sheetpile Placement	3,044,194	sf	\$57,839,688
Clean Soil Cap	5,690,230	cy	\$56,902,299
Seeding	5,690,230	sy	\$5,690,230
Mitigation	1,176	acre	\$11,756,673
Direct Capital:			\$451,476,551
Engineering, Procurement & Construction Management:			\$54,177,186
Total Capital:			\$505,653,737
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Mitigation	40	10,000	\$150,463
Long-term Monitoring	40	650,000	\$9,780,093
Long-term O&M	40	10,113,075	\$152,164,325
Total Present Worth, Longer Term O&M Costs			\$162,094,881
Total Project Capital and O&M Cost			\$667,700,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$1,155,100,000

ALTERNATIVE G: Dredge Sediment to CAD

SEDIMENT REMOVAL (MECHANICAL DREDGING)

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	8	LS	\$2,800,000
Watertight Barges	4	ea	\$400,000
Dredging - 12 hour shifts	10,907	Day	\$327,210,000
Dredge Monitoring (Water Quality)	10,907	Day	\$32,721,000
Sediment Removal QA	10,907	Day	\$13,088,400
Site Restoration	1	ea	\$670,000
Direct Capital:			\$376,889,400
Engineering, Procurement & Construction Management:			45,226,728
Contractor Overhead/Profit:			56,533,410
Total Capital:			\$478,600,000

WATER TREATMENT

Capital Items	Quantity	Units	Cost
820 gpm unit, Purchase	1	LS	\$1,676,421
Water Treatment (Includes Operator)	5,432,013,966	gal	\$2,172,806
Water Treatment QA	1,909	day	\$381,800
Direct Capital:			\$4,231,027
Engineering, Procurement & Construction Management:			507,723
Total Capital:			\$4,700,000

CAD CONSTRUCTION

Capital Items	Quantity	Units	Cost
Mobilization - Equipment and Silt Curtain	1	LS	\$170,000
Dredging - 12 hour shifts	41,548	Day	\$236,823,600
Sand Purchase	11,451,588	tons	\$68,709,526
Placement	8,179,706	cy	\$49,078,233
Cap Placement QA	1	LS	\$100,000
Direct Capital:			\$354,881,359
Engineering, Procurement & Construction Management:			42,585,763
Total Capital:			\$397,467,122
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
<u>Monitoring/O&M</u>			
Long-term Monitoring	40	\$400,000	\$6,018,519
Long-term O&M	40	\$7,949,342	\$119,608,166
Total Present Worth, Longer Term O&M Costs			\$125,626,685
Total Project Capital and O&M Cost			\$523,100,000

INSTITUTIONAL CONTROLS

Capital Items	Quantity	Units	Cost
Deed Restrictions	1	LS	\$5,000
Direct Capital:			\$5,000
Engineering, Procurement & Construction Management:			600
Total Capital:			\$5,600
Present Worth of Longer Term Operating Costs	Years	Annual Cost	
Long-term Monitoring (no action)	40	\$300,000	\$4,513,889
Total Present Worth, Longer Term O&M Costs			\$4,513,889
Total Project Capital and O&M Cost			\$4,500,000
TOTAL COST			\$1,010,900,000

**Table 7-3 Cost Summary for Remedial Alternatives - Zone 4
500 ppb**

Alternative	Dredge Volume (cy)	Hydraulic Dredging	Mechanical Dredging	Dewatering	Water Treatment	CAD Construction	CDF Construction	Off-site Disposal	Institutional Controls	Subtotal	20% Contingency	TOTAL
A	0	---	---	---	---	---	---	---	\$4,500,000	\$4,500,000	\$900,000	\$5,400,000
B	0	---	---	---	---	---	---	---	\$9,900,000	\$9,900,000	\$1,980,000	\$11,880,000